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## THE DIAGNOSIS AND TREATMENT OF ACUTE APPENDICITIS AND ITS COMPLICATIONS*


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THERE is no need of apologizing for bringing up a discussion on appendicitis, for this condition is responsible for the major portion of our emergency abdominal surgery. John B. Murphy expressed himself on this subject years ago, as follows: "Is it time to stop talking about appendicitis? No! It is just the time to begin talking about it and talk about it most seriously and emphatically!"

The archives are filled with reports on far larger groups of cases than mine. What I have to say about the diagnosis and treatment of acute appendicitis will be told in as few words as possible. No attempt will be made to simulate a textbook presentation of this subject and my remarks will be based almost entirely on an experience with 233 consecutive operations for appendicitis over a period of approximately eleven years.

### Diagnosis

The patient typically presents himself, or herself, for examination either in bed at home or by limping into the office or hospital. On being asked, "What is the chief complaint?" the patient complains of stomach ache, cramps, or pain in the side. The duration of this symptom is from a few hours to four or five days. There is frequently nausea or vomiting, especially in complicated cases, and in children these symptoms may be more pronounced. The number of times vomiting occurs usually depends upon the number of times food or water has been attempted. Cathartics are frequently taken and they invariably create an exacerbation of the pain. The stomach ache or cramps start in the center of the abdomen, about the umbilicus or epigastrium and shift to the lower right quadrant in eight to twelve hours. The right thigh may be slightly flexed. Constipation is the general rule, but occasionally there is diarrhea. The temperature may be only slightly elevated and varies from 99 to 101 as a general rule, although perforation may be followed by a subnormal and later complications by a much higher temperature. The pulse is slightly elevated to 90 or 100 per minute. The leukocyte count should be well over 12,000 in an acute suppurative case.

Physical examination should begin with palpation of the left lower quadrant and working around the abdomen counter clockwise until the lower right quadrant is reached, using first gentle and then deeper pressure. In a typical case the tenderness will increase as one approaches McBurney's point in the lower right quadrant. Pressure over this area usually causes the patient to squirm and exclaim with pain. In cases where there is an atypical position of the appendix, the maximum point of tenderness may be at the outer side of the right loin in the case of a retrocecal appendix, or in the pelvis if it hangs over the pelvic brim. In these latter cases vaginal or rectal examination is quite often necessary in order to reveal the tender area, while in cases where the appendix points medially and to the back of the abdomen and lies under the mesentery of the ileum, deep palpation is necessary to elicit the typical tender area. Flexing the right thigh on the abdomen while extending the lower leg is a valuable maneuver where a deep seated appendix may be lying near the psoas muscle. Rebound tenderness and hyperesthesia of the

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skin are less valuable signs. Muscular rigidity in the lower quadrant will be present, especially if there is any amount of periappendicitis. Perforation is accompanied by a more general extension of tenderness over the lower abdomen and there is a definite decrease in pain for a time until peritonitis sets in, when there is increasing distention and pain with a recurrence of vomiting. An appendiceal abscess gives a sensation of rather firm, solid resistance on palpation and is accompanied by a longer history. I have never seen a case of left sided appendix. The urine should show no pus cells. However, if the above syndrome is typical, I should prefer to operate immediately, even though there are a few pus cells in the urine.

One is frequently called upon to rule out one or more of the following diseases:

1. In *salpingitis* one may have a history of neisserian infection. The tenderness is lower down, both sides of the lower abdomen are tender and on vaginal examination there is far more tenderness on moving the cervix. Vaginal discharge and the Gram-negative diplococci are usually present in the secretion of the cervix.

2. In *ectopic pregnancy* there is usually a history of a missed period and spotting. Palpation discloses a mass and extreme tenderness on vaginal examination. Pallor and quickened pulse are additional valuable signs in ruptured cases.

3. *Intestinal obstruction* has a more abrupt onset, more frequent vomiting with absence of stool and flatus from the rectum. The abdominal tenderness is more generalized and the pain more severe.

4. *Gallstone colic* is accompanied by a history of dyspepsia, gas and possibly jaundice. The pain and tenderness are in the upper abdomen and referred to the shoulder. The vomiting is more frequent.

5. In *perforated peptic ulcer* one may find a typical ulcer history. The onset is more sudden, the rigidity of the entire abdomen is "board-like" and the pain steady. Also there is decreased liver dullness and a gas bubble below the diaphragm.

6. *Renal colic* is associated with frequency of urination and possibly blood or pus in the urine. The pain radiates down to the genital organs or thigh and a flat plate of kidney, ureters and bladder is apt to show a shadow in the renal pelvis or along the course of the ureter.

7. *Ovarian lesions,* such as a twisted ovarian cyst, can usually be detected by vaginal examination, while a ruptured lutein cyst may be difficult to rule out except when there are signs of hemorrhage present, when it simulates the picture of ruptured ectopic pregnancy.

8. *Pyelitis, hydronephrosis and renal tumors* are eliminated by urine examination and pyelography, as well as palpation.

9. A *spastic bowel* gives a fairly typical history of generalized colicky pain over a long period of time, with frequent bowel movements or passage of gas by rectum.

10. *Mesenteric thrombosis* is characterized by a sudden onset of most severe pain. The temperature may be high and blood is vomited later. The tenderness is more generalized.

11. Acute infectious diseases such as pneumonia in children, measles, scarlet fever and influenza may be ruled out by history of exposure, examination of chest and mouth, as well as the leukocyte count.

12. *Acute pancreatitis* is characterized by a rapid onset, extremely rapid pulse, frequent vomiting and collapse. The tenderness is higher in the abdomen than in a case of appendicitis.

13. *Tabes dorsalis* gives the typical neurological findings of frozen pupils, absent knee jerks and possible history of primary lesion with a genital scar.

14. *Inflammation of Meckel's diverticulum* is not usually diagnosed until operation.

15. *Appendiceal neurosis.* There are some patients who may be said to be "appendicitis minded." The only way to surely eliminate these cases from the operative group is, when suspected, to engage them in conversation and palpate the abdomen at the same time. If one is fortunate enough to interest them deeply in some other subject, the typical tenderness is absent.

I have refrained from mentioning the value of the leukocyte count in these differential diseases, as in borderline cases it is misleading, except in those cases accompanied by a leukopenia.

### Treatment

The only treatment to consider in the first three days of acute appendicitis is appendectomy. After this time one must individualize cases and put the majority of them on the Ochsner treat-

ment until the inflammatory lesion clears up or an abscess forms. I see fewer of these late cases now than ten years ago and have treated at least a dozen or more of them in this manner with no mortality. Some of them came to operation later and are reported in this group, but those which cleared up are not included.

Once operation is decided upon, this is best done as soon as possible and may be performed under ether, ethylene gas, chloroform, local infiltration or subarachnoid block. My preference is for ether or subarachnoid block. I believe it makes very little difference which of these two methods is used as long as the cases are well selected and the method used adapted to the patient. Preparation is made by giving an enema, unless perforation is suspected. A preliminary hypnotic of morphine sulphate gr. 1/6 to ¼ and atrophine sulphate gr. 1/150, if ether is to be used, is given and the skin on the operative site shaved and cleansed with tincture of green soap. In the operating room two applications of Tr. merthiolate (1:1,000) are given to the skin. The operative area is surrounded with sterile towels. I use McBurney's incision in all cases diagnosed as acute appendicitis. The abdomen is opened through this muscle-splitting incision, being careful to cover the wound edges with sterile towels fastened on by Backus towel clips. On opening the peritoneum a pair of ribbon retractors are used to give additional exposure. The cecum is picked up by the aid of a gauze sponge and pulled up until the base of the appendix is exposed, or if bound down the finger of the gloved hand is used to gently separate the adherent organ. At times these adhering bonds are so resistant to blunt dissection that one must sever them by scalpel or scissors, being careful to control any bleeding by clamp and ligature. Other times one had best remove the organ in reverse manner, first clamping, ligating, cutting and inverting the stump, then at the same time proceeding toward the tip to clamp the blood supply of the meso-appendix and working down dissecting adherent structures. In a typical case, the meso-appendix is first ligated with chromic No. 1 catgut. The base of the appendix next the cecum is crushed and ligated with chromic No. 1 catgut. A purse-string suture of gastro-intestinal No. 0 chromic catgut is then inserted in the cecum about the base of the appendix. The diameter of this purse-string, from one side to the other, should be about the size of a penny to that of a nickel. After inserting the purse-string suture, a clamp is placed a safe distance above this ligature and the appendix severed about ⅛ inch above the ligature. The cecum is held in place by the finger tips at the same time. The stump is treated with carbolic acid and alcohol, inverted with an appendix tucker and the purse-string drawn tight and tied. In addition to the purse-string suture an N suture is placed in the cecum to further invert the stump and guard against a "blow-out." There are occasional cases in which the cecum is so friable and thickened that an N suture is used to invert the stump instead of a purse-string. A second ligature is then placed about the meso-appendix, using the remaining ends of the N suture. The meso-appendix is pulled up over the buried stump, giving additional insurance against a "blow-out," as well as doubly insuring hemostasis of the meso-appendix. There are occasional cases where, due to a short meso-appendix, this cannot be done. Any blood or exudate is carefully mopped out of the peritoneal cavity, attending carefully to hemostasis. Also in those cases which are ruptured or accompanied by a purulent exudate, the pelvis and right hepatic fossa are carefully mopped free of any collection of pus and a hot wet laparotomy sponge is placed in the intra-abdominal operative field for one to two minutes. In the cases where one wishes to drain, the tubes are now placed in the pelvis, to the stump of the appendix or the right subhepatic space. The hands are now carefully cleansed and the peritoneum closed with chromic No. 1 catgut, plain interrupted catgut sutures in the muscle and the fascia with chromic No. 2 continuous catgut. Interrupted silkworm gut sutures are placed in the skin and the wound cleansed with 1:1000 solution merthiolate, then covered with gauze.

The manner of placing and type of drain is rather important. I drain most cases which are perforated or accompanied with a large collection of purulent exudate in the pelvis or subhepatic space, at times using two drains. When the exudate is thick, a split rubber tube is used, and, if thin, a soft cigarette drain, these drains being placed in such a manner as to lie between the coils of intestine, cecum and the parietal peritoneum of the lateral abdominal wall. A cigarette drain is removed in two or three days and a split rubber tube in four or five days.

In the case of a localized abscess the appendix is not sought. The abscess is emptied, the cavity explored, a split rubber tube or two placed in the same and the abdominal wall closed loosely about the drains, which are stitched in place and then removed in five to seven days.

After the operation, in the case of simple acute appendicitis, the patient is placed in bed in the recumbent position. In cases of extensive peritonitis accompanied by a large amount of purulent exudate, they are placed in Fowler's position after recovering from the anesthesia. Rinsing the mouth with water is allowed on the first day, sips of water on the second, light liquid and liquid diet on the third and fourth day, soft diet from the fifth to the eighth postoperative days and regular diet on the eighth, on which day the patient is allowed out of bed. A soapsuds enema is given routinely on the third postoperative day and on alternate days from then on, unless bowel movement occurs normally. No cathartics are allowed for at least two weeks after operation. The stitches are removed on the seventh postoperative day. In case of appendiceal abscess, hot wet packs are used routinely.

Distention, due to paralytic ileus, is treated by withholding oral intake of water and food, using also physostigmine sulphate gr. 1/100 by hypo, turpentine enemata, pituitrin (surgical) by hypo, rectal tube, and turpentine stupes to the abdomen. Dextrose and saline solutions are used intravenously if the patient seems dehydrated, as in cases where nausea and vomiting persist, or where peritonitis seems to be advancing. However, this is not used in routine cases. Jejunostomy was used in one case where advanced generalized peritonitis occurred. It was quite efficient. This was before the advent of the Wangensteen tube. I have not as yet had the occasion to use the latter in appendicitis. Morphine sulphate, gr. 1/6 to ¼, by hypo, is used during the first few days.

Secondary abdominal abscesses may occur and these should be carefully looked for in any case where a week or so after the operation there is an increased pain and elevation of temperature. When well localized with the assistance of hot wet packs, these may be opened and drained through the abdominal wall, rectum or vagina under local infiltration or general anesthesia.

Thrombophlebitis of the leg is treated by elevation, rest and ice bag for two or three weeks until the clot becomes organized. Pneumonia is treated in the routine manner of any bronchopneumonia with especial attention to fluid intake. I have had no cases of hepatic abscess or pylephlebitis. Patients with cardiac decompensation may be given digitalis by injection if necessary. Fecal fistulæ should clear up spontaneously. I have had only one such complication and this closed rapidly on a low residue diet.

Patients are discharged from the hospital on the tenth postoperative day, except in case of drainage, when they are retained until all drainage ceases. In uncomplicated cases they are allowed light work in two or three weeks after operation and regular work in a month.

Following the above outlined method of treatment, 233 consecutive operations for appendicitis have been performed over an eleven-year period. I have used the following classification according to gross pathology. Chronic includes those cases in which the lumen is obliterated partially or the walls markedly thickened. Fecaliths may or may not be present. Subacute includes those cases of simple hyperemia of the outside of the appendix without swelling or free pus in the lumen. Acute catarrhal applies to those cases showing swelling of the walls and plastic exudate on the outside, with a small amount of free pus in the lumen. Acute suppurative are those cases in which the organ is swollen, covered with plastic exudate and the lumen filled with pus. This type is frequently associated with a fecalith. A gangrenous appendix is swollen, is accompanied by some plastic exudate and the walls are green or greenish black in color. These always seem to be accompanied by a fecalith, which assists in causing the obstruction of circulation. Ruptured cases include those with any or all of the above changes, in which there is a hole in the wall of the appendix visible to the naked eye. Appendiceal abscess is also included in this group. The accompanying figures give the number of cases in each group, with the number of deaths and the mortality rates.

It will be seen from this that there were 149 cases of acute catarrhal, suppurative, gangrenous and ruptured appendicitis, with one death, being a mortality rate of .67 per cent in this group, which includes all complicated and uncomplicated acute cases. The one death was a case of walled-off abscess located in the center of the abdomen in the retroperitoneal space and cov-

| Group | No. Cases | Deaths | Per cent |
|---|---|---|---|
| Chronic and subacute | 84 | 0 | 0 |
| Acute catarrhal, suppurative and gangrenous | 108 | 0 | 0 |
| Acute ruptured and abscess | 41 | 1 | 2.4 |
| TOTAL CASES | 233 | 1 | .4 |

ered in front by coils of intestines. This abscess was successfully drained without the incidence of peritonitis. During the second month of his postoperative course, however, he developed an intractable diarrhea, apparently from ulceration of the abscess into the bowel, draining pus by the rectum. The diarrhea could not be controlled and in spite of blood transfusion and other therapy he died approximately two months after operation.

### Conclusions

1. A rather low mortality rate was experienced in a small group of cases of complicated and uncomplicated acute appendicitis.

2. The classification of those cases for operation and those for Ochsner treatment seems to be rather important.

3. Extreme care in regard to selection and placing of drains may, to some extent, assist in lowering mortality rates.

4. A careful and conservative postoperative diet may also assist in lowering the mortality rate.

5. The McBurney incision is the ideal incision for acute appendicitis, especially if drainage is anticipated.

6. Reinforcement of the purse-string suture by an additional N suture may be of some value in prevention of postoperative "blow-outs" of the inverted stump.

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## EXTREME CARDIAC HYPERTROPHY*

### A Report of Forty-four Cases in Which the Heart Weighed 800 Gm. or More

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THE causes of moderate cardiac hypertrophy are rather well known, but the more common causes of enormous cardiac enlargement are not fully appreciated by most physicians. This study was undertaken to determine the most common causes of extreme cardiac hypertrophy.

### Material

The material for this study consisted of clinical and postmortem records of forty-four cases in which the heart weighed 800 gm. or more. The hearts were weighed after they were removed from the body in the usual manner. The large vessels were cut at the base of the heart, which was opened and washed free of blood clots. There were four cases in which the heart weighed between 790 and 800 gm. These were included because we felt that the technical errors in removing the organ would make the weight vary at least 10 gm.

The estimated weight of the normal heart for any patient of a known weight was obtained by multiplying the body weight in grams by 0.43 if the patient was a man and by 0.40 if the patient was a woman, or by multiplying the body weight in pounds by 1.96 if the patient was a man and by 1.8 if the patient was a woman. The latter formula, which was devised by one of us

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TABLE I. CLINICAL DATA IN TWENTY CASES IN WHICH ENLARGEMENT OF THE HEART RESULTED FROM HYPERTENSION

| Age, yrs. | Sex | Height, inches | Body weight, lbs. | | | Heart weight, gm. | | | Coronary sclerosis, grade |
|---|---|---|---|---|---|---|---|---|---|
| | | | Actual | Estimated normal | Over-weight | Actual | Estimated normal* | Over-weight | |
| 46 | M | 75 | 213 | 203 | 10 | 1100 | 417 | 683 | |
| 50 | M | 67 | 170 | 156 | 14 | 870 | 333 | 537 | |
| 62 | M | 68 | 178 | 163 | 15 | 852 | 353 | 499 | 3 |
| 63 | M | 71 | 225 | 178 | 47 | 842 | 441 | 401 | |
| 54 | F | 67 | 219 | 158 | 61 | 838 | 394 | 444 | |
| 57 | M | 70 | 226 | 173 | 53 | 827 | 441 | 386 | |
| 64 | M | 67 | 180 | 158 | 22 | 825 | 353 | 472 | 2 |
| 64 | M | 71 | 200 | 178 | 22 | 825 | 392 | 433 | |
| 47 | M | 70 | 235 | 169 | 66 | 820 | 461 | 359 | |
| 56 | M | 70 | 200 | 173 | 27 | 815 | 392 | 423 | 3 |
| 40 | M | 65 | 200 | 145 | 55 | 810 | 392 | 418 | |
| 49 | M | 63 | 165 | 141 | 24 | 810 | 323 | 487 | |
| 63 | M | 65 | 280 | 149 | 131 | 807 | 549 | 258 | |
| 66 | M | 65 | 175 | 149 | 26 | 805 | 343 | 462 | 4 |
| 56 | M | 73 | 175 | 191 | 16** | 800 | 343 | 457 | |
| 51 | M | 68 | 200 | 162 | 38 | 800 | 392 | 408 | |
| 58 | M | 70 | 200 | 173 | 27 | 800 | 392 | 408 | 3 |
| 56 | M | ? | 235 | ? | ? | 795 | 461 | 334 | |
| 46 | M | 65 | 160 | 148 | 12 | 795 | 313 | 482 | |
| 42 | M | 70 | 175 | 169 | 6 | 793 | 343 | 450 | |

*Male: Body weight in pounds x 1.96.
Female: Body weight in pounds x 1.8.

**Underweight.

us (Smith),[4] will give the calculated normal weight of the heart in grams. These formulas are accurate if the patients are of normal weight, but they do not hold for patients who are greatly overweight. It has never been proved accurately just how much the heart of a very obese person should weigh.

The forty-four cases can be divided into three main groups, according to the clinical diagnosis: cases of hypertension, cases of chronic endocarditis, and a miscellaneous group of cases. There were twenty cases in which a diagnosis of hypertension was made and fifteen cases in which the principal diagnosis was chronic rheumatic endocarditis with deformed heart valves. In the miscellaneous group there were two cases in which nothing was found to explain the enormous cardiac hypertrophy except extreme obesity. Two patients had syphilitic aortitis with aortic insufficiency, one patient had a very unusual congenital patent foramen ovale,[1] three patients had severe coronary sclerosis, and one had an adenomatous goiter with hyperthyroidism.

In the twenty cases of hypertension nineteen of the patients were men and one was a woman (Table I). The oldest patient in this group was sixty-six years and the youngest was forty years, the average age being 54.5 years. The largest patient in this group weighed 280 pounds (127 kg.) and the smallest 160 pounds (72.6 kg.); the average weight of these patients was 200½ pounds (90.9 kg.). The largest heart in the cases of hypertension weighed 1100 gm., the smallest weighed 793 gm., and the average weight of the heart was 831.4 gm.

In the fifteen cases of chronic endocarditis all of the patients were men (Table II). The

TABLE II. CLINICAL DATA IN FIFTEEN CASES IN WHICH ENLARGEMENT OF THE HEART RESULTED FROM CHRONIC ENDOCARDITIS

| Age, Years | Sex | Height, inches | Body weight, lbs. | | | Heart weight, gm. | | | Diagnosis |
|---|---|---|---|---|---|---|---|---|---|
| | | | Actual | Estimated normal | Over-weight | Actual | Estimated normal* | Over-weight | |
| 58 | M | 68 | 133 | 163 | 30** | 1170 | 265 | 905 | Calcified aortic stenosis, chronic adhesive pericarditis, grade 2, and coronary sclerosis, grade 3 |
| 40 | M | 72 | 200 | 180 | 20 | 1017 | 392 | 625 | Rheumatic aortic endocarditis, calcified aortic stenosis and mitral insufficiency |
| 62 | M | 72 | 160 | 184 | 24** | 980 | 313 | 667 | Calcified aortic stenosis |
| ? | M | 68 | 180 | ? | | 970 | 353 | 617 | Calcified aortic stenosis |
| 58 | M | 68 | 154 | 163 | 9** | 960 | 304 | 656 | Aortic and mitral endocarditis; chronic adhesive pericarditis |
| 30 | M | 69 | 180 | 156 | 24 | 950 | 353 | 597 | Aortic insufficiency; mitral stenosis and adhesive pericarditis |
| 20 | M | 69 | 155 | 148 | 7 | 902 | 304 | 598 | Chronic aortic insufficiency (rheumatic), mitral stenosis and adhesive pericarditis, grade 4 |
| 46 | M | 67 | ? | 156 | | 892 | | | Calcified aortic stenosis |
| 58 | M | 67 | 175 | 158 | 17 | 862 | 343 | 519 | Aortic stenosis and mitral stenosis |
| 30 | M | 68 | 250 | 152 | 98 | 832 | 490 | 342 | Aortic and mitral endocarditis; chronic adhesive pericarditis |
| 45 | M | 70 | 235 | 170 | 65 | 820 | 461 | 359 | Calcified aortic stenosis |
| 45 | M | 66 | 165 | 151 | 14 | 820 | 323 | 497 | Calcified aortic stenosis |
| 64 | M | 72 | 214 | 184 | 30 | 820 | 419 | 401 | Calcified aortic stenosis |
| 38 | M | 66 | 160 | 148 | 12 | 792 | 313 | 479 | Aortic regurgitation |
| 40 | M | 68 | 136 | 136 | 0 | 800 | 265 | 535 | Mitral stenosis and chronic adhesive pericarditis |

*Body weight in pounds x 1.96.
**Underweight.

oldest patient in this group was sixty-four years of age, the youngest was twenty years and the average age was 45.3 years. The largest patient in this group weighed 250 pounds (113.4 kg.), the smallest weighed 133 pounds (60.3 kg.), and the average weight for the group was 178.3 pounds (80.8 kg.). The largest heart in this group weighed 1170 gm., the smallest weighed 792 gm., and the average weight of the heart was 905.8 gm.

There were two cases in which we found no cause for the extreme cardiac hypertrophy except the marked obesity (Table III). In one of these cases the patient was a man, aged thirty-three years, whose body weight was 550 pounds (249.4 kg.) and whose heart weighed 929 gm. In the other case the patient was a man, aged sixty years, who weighed 350 pounds (158.7 kg.) and whose heart weighed 922 gm.

There were two men who had syphilitic aortitis with aortic insufficiency. One was fifty-one years of age and weighed 147 pounds (66.7 kg.); his heart weighed 832 gm. The other was sixty-two years of age and weighed 178 pounds (80.7 kg.); his heart weighed 900 gm.

In three cases the diagnosis was coronary sclerosis with myocardial infarction. One patient, who was sixty-nine years of age, had coronary sclerosis, grade 4, with chronic myocardial infarction, and diabetic gangrene. He had undergone four amputations of portions of his feet. There is a possibility that at some previous time he might have had an elevated blood pressure although very little evidence for this assumption

TABLE III. CLINICAL DATA IN NINE CASES IN WHICH ENLARGEMENT OF THE HEART RESULTED FROM VARIOUS CONDITIONS

| Age, yrs. | Sex | Height, inches | Body weight, lbs. | | | Heart weight, gm. | | |
|---|---|---|---|---|---|---|---|---|
| | | | Actual | Estimated normal | Over-weight | Actual | Estimated normal* | Over-weight |
| **Obesity** | | | | | | | | |
| 33 | M | 72 | 550 | 175 | 375 | 929 | 1078 | 149** |
| 60 | M | 73 | 350 | 191 | 159 | 922 | 686 | 236 |
| **Coronary sclerosis** | | | | | | | | |
| ? | M | 71 | 190 | | | 825 | 373 | 452 |
| 53 | M | 70 | 187 | 172 | 15 | 925 | 373 | 552 |
| 69 | M | ? | 182 | | | 850 | 353 | 497 |
| **Syphilitic aortitis with aortic insufficiency** | | | | | | | | |
| 62 | M | 67 | 178 | 158 | 20 | 900 | 353 | 547 |
| 51 | M | 51 | 147 | 137 | 10 | 832 | 274 | 558 |
| **Congenital patent foramen ovale, 10 x 17 cm.** | | | | | | | | |
| 70 | M | 69 | 136 | 168 | 32** | 880 | 265 | 615 |
| **Adenomatous goiter with hyperthyroidism** | | | | | | | | |
| 55 | M | 70 | 180 | 173 | 7 | 848 | 353 | 495 |

*Body weight in pounds x 1.96.
**Underweight.

was obtained at necropsy. Of the other two patients who had marked coronary sclerosis, one had an adhesive pericarditis and the other showed evidence of having had chronic diffuse nephritis. In two of the three cases in which a diagnosis of severe coronary sclerosis was made, there were other causes for cardiac enlargement; in one of these cases the patient had chronic adhesive pericarditis and in the other case the patient had chronic diffuse nephritis. This leaves only one case in which nothing was found to explain the cardiac hypertrophy except the coronary sclerosis with infarction. It would seem to us that this alone is hardly an adequate explanation.

There was one patient, a man, aged fifty-five years, who had an adenomatous goiter with hyperthyroidism. There was evidence that he had had congestive heart failure for a long time. It seems somewhat unusual that hyperthyroidism alone should produce the amount of cardiac hypertrophy that was found in this case.

There was one patient, a man, aged seventy years, who had an unusual patent foramen ovale which measured 10 by 17 cm.

Golden and Brams[2] reported thirty-eight cases from the literature and added nine cases of their own; in all of these cases the heart weighed 1000 gm. or more. Some of the thirty-eight cases reported in the literature were published many years ago and the data in some of them were very meager. Chronic aortic endocarditis was probably the most common cause of cardiac enlargement in both series of cases. In many instances there was more than one factor which would account for the cardiac enlargement. Several of the cases which were reported in the early literature were reported before hypertension was well understood and before it was considered an important factor in the production of cardiac hypertrophy; therefore, it is impossible to know the exact rôle that this factor played in the production of cardiac enlargement in these cases.

Probably the largest heart on record is one that was in the museum of St. George's Hos-

TABLE IV. SUMMARY OF CASES IN WHICH HYPERTENSION OR ENDOCARDITIS CAUSED CARDIAC ENLARGEMENT

| Hypertension | | | | | |
|---|---|---|---|---|---|
| Age, years | | | Body weight, lbs. | | |
| Oldest | Youngest | Average | Largest | Smallest | Average |
| 66 | 40 | 54.5 | 280 | 160 | 200.5 |
| Sex | | | Heart size, gm. | | |
| Males | | Females | 1100 | 793 | 831.4 |
| 19 | | 1 | | | |
| **Endocarditis** | | | | | |
| Age, years | | | Body weight, lbs. | | |
| Oldest | Youngest | Average | Largest | Smallest | Average |
| 64 | 20 | 45.2 | 250 | 120 | 178.3 |
| Sex | | | Heart size, gm. | | |
| Males | | Females | 1170 | 800 | 905.8 |
| 15 | | 0 | | | |

pital, in London. It is rather often referred to in the literature. Sedgwick[3] first referred to this heart in 1854. It was the heart of a middle aged man who had suffered from heart disease for many years, but the details of the heart and case are entirely lacking. This heart is supposed to have weighed 5 pounds (2,272 gm.).

## Comment

In this series of forty-four cases of extreme cardiac hypertrophy there was often more than one cause for the enormous cardiac enlargement. In thirteen of the twenty cases of hypertension, obesity was present. In the cases of chronic endocarditis more than one valve was usually involved. There were six instances in which only a single valve was involved, that is, five instances of calcified aortic stenosis and one of aortic regurgitation. In six of the nine cases in which more than one valve was involved, chronic adhesive pericarditis was present.

It is rather interesting to note that the chief causes for extreme cardiac hypertrophy in this group of cases were chronic aortic endocarditis and hypertension, although in many instances added factors, such as chronic pericarditis and obesity, were present. Chronic aortic endocarditis is a more important factor in the production of extreme cardiac enlargement than is hypertension, that is, it produces larger hearts than does hypertension. In the cases of hypertension nineteen of the patients were men and one was a woman. The average age of these patients was 54.5 years, the average body weight was 200½ pounds (90.9 kg.), and the average weight of the heart was 831.4 gm. (Table IV). In the fifteen cases of chronic endocarditis all of the patients were men. Their average age was 45.3 years, the average body weight was 178.3 pounds (80.8 kg.), and the average weight of the heart was 905.8 gm. That is, the patients who had endocarditis were 9.2 years younger than were the patients who had hypertension. The average weight of the patients who had endocarditis was 22.2 pounds (16.3 kg.) less than that of the patients who had hypertension and the average weight of the heart was 74.4 gm. greater in the cases of endocarditis.

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# SPONTANEOUS CURE OF ACUTE REGIONAL ENTERITIS

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IN 1932, Crohn and his co-workers[1] clearly described a clinical and pathological entity termed regional ileitis. Subsequent reports proved that the disease process may involve other parts of the intestine, therefore a more comprehensive term, regional enteritis, has gradually been adopted.

The disease is a non-specific, granulomatous, necrotizing, and cicatrizing inflammatory lesion of the intestinal tract usually involving the terminal ileum, and occurring mainly in young adults. Clinically the disease is characterized by symptoms of peritoneal irritation, increased bowel motility, chronic partial intestinal obstruction, abscess formation, and the development of internal and external fistulous tracts. The course of the disease is usually progressive with remissions and exacerbations, gradually passing from the acute to the chronic stage.

During the past seven years numerous articles have appeared in the literature on the subject of ileitis and considerable knowledge of the chronic stage of the disease has been accumulated. Very little has been written concerning the course and prognosis of the early or acute phase. Undoubtedly, more information will be acquired in the future as the early cases are studied more diligently from the clinical as well as from the roentgenological standpoint.

Crohn[2] states that acute ileitis may run a variable course. Of his eleven patients with acute ileitis, three had a remission of their symptoms, suggesting that a spontaneous cure is possible occasionally. Koster[3] explored six patients with acute ileitis without further surgical interference. These nine patients seem to have done well up to the time of the publications by these authors, though detailed descriptions of their cases were lacking. Likewise, Mixter[4] states that a spontaneous cure may take place, although the definite establishment of this contention has yet to be confirmed by a long period of observation or by pathological demonstration in operatively proved cases.

The following case of regional enteritis involving the terminal segment of the ileum is reported because it represents a spontaneous recession of symptoms in a patient who is well two and one-half years after the onset of the acute phase of the disease. Though the progressive character of the disease to chronicity can not be denied, it is possible that more of the cases in the acute phase of this disease have spontaneous recoveries than is hitherto recognized.

## Case Report

The patient, a white man, twenty-one years of age, registered at the Minneapolis General Hospital on November 6, 1936. For two weeks prior to admission he complained of moderately severe, intermittent, crampy abdominal pain referred, primarily, to the right lower quadrant of the abdomen. He also complained of anorexia, nausea, and diarrhea, having two to five loose stools daily. In his past history there was a mild attack of rheumatic fever in 1934.

Physical examination revealed a tall, asthenic, young man with normal physical findings except for the abdomen. The admission temperature, pulse, respirations, and blood pressure were normal. There was moderate tenderness and slight muscle spasm elicited in the right lower quadrant of the abdomen. There was no rebound tenderness. A moderately soft, ropey, freely movable, tender mass about 3 centimeters in width and 7 centimeters in length was vaguely palpable in the right lower quadrant. There was no abdominal distention. Ausculatory examination of the abdomen and rectal examination were negative.

On admission the urinalysis was normal, the hemoglobin, 94 per cent; the erythrocyte count, 4,700,000; the leukocyte count, 5,900, with a normal differential leukocyte count. The Wassermann reaction and Kahn test were normal. The patient was observed for a period of four days during which time the temperature, pulse and leukocyte counts remained normal. The symptoms that were present on admission remained essentially the same. A provisional diagnosis of appendicitis was made and appendectomy advised.

On November 10, 1936, the author opened the abdomen under spinal anesthesia. The appendix was found to be free in the right iliac fossa with minimum swelling and injection of the serosa. There were no enteroliths, adhesive bands, or kinks of the appendix. The terminal ileum was the primary site of the pathology. From the ileocecal valve extending proximally for a distance of 25 centimeters, the ileum was swollen to a diameter of 6 centimeters, markedly edematous, and boggy. The greatly thickened, resistant wall of the ileum prevented palpation of the lumen. The serosa was rough, with a fine flakey, shaggy, white

exudate scattered over a reddened and injected surface. Proximally, the inflammatory process was sharply demarcated from the normal ileum. Above the lesion the wall of the ileum was thin and collapsed. There was slight edema, thickening, and adenopathy of the mesentery in the region of the involved ileum. Further examination of the small intestine did not expose other areas of involvement. The appendix was removed and the stump inverted, using a purse-string suture of silk. This procedure was done even though the appendix seemed to play an innocent rôle in the inflammatory process of the ileum. The wound was closed without further surgical interference.

Fig. 1. Roentgenogram showing acute regional enteritis of the terminal segment of the ileum twelve days after the operative diagnosis was made.

Fig. 2. Roentgenogram showing the contour of the terminal ileum two and one-half years after the onset of the acute ileitis.

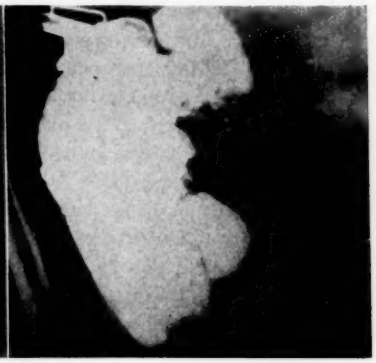

Fig. 3. Roentgenogram taken at the same time as Figure 2, with the terminal ileum partly empty showing the mucosal pattern.

There was a slight elevation of temperature following the operation with a return to normal on the fourth postoperative day. The wound healed solidly without wound complications. The patient continued to have intermittent, mild abdominal pain in the right lower quadrant, and two to three loose stools daily. His weight was 136 pounds.

The pathologist reported the appendix to be 7 centimeters long with a bulbous tip, and moderate hyperemia of the walls, but no gross induration. The lumen was patent. Microscopically, the serosa appeared slightly edematous and contained a few perivascular foci of lymphocytes. There were a few scattered polymorphonuclear cells throughout all of the coats. The diagnosis was mild acute appendicitis.

On the tenth and twelfth postoperative days roentgenographic studies of the ileum were made by giving a barium meal as well as a barium enema. The roentgenogram (Fig. 1) obtained by giving the barium orally revealed an irregular, fuzzy, filling defect of the terminal segment of the ileum with definite narrowing of the lumen suggesting the characteristic string sign so commonly observed in roentgenograms of ileitis.

On the fourteenth postoperative day the patient was discharged from the hospital to the care of his private physician, Dr. Einer Monson, to whom the author is indebted for his coöperation in completing the data in this report.

A medical regimen of rest, bland diet, and kaomagma was instituted. The patient adhered to this treatment for a period of six to nine months during which time the intermittent attacks of abdominal pain and diarrhea gradually subsided. For the past year and one-half he has been living on a normal diet with normal activity, and has been symptom free except for an occasional temporary intestinal upset following an alcoholic debauch. For a number of months he has maintained a weight of 158 pounds.

In March, 1939, roentgenographic studies of the terminal ileum were repeated by giving the barium orally. The roentgenogram (Fig. 2) showed that the terminal segment of the ileum filled normally with barium and that peristalsis was present. The fuzziness, filling defect, and string sign observed in the immediate postoperative studies were no longer present. The roentgenogram (Fig. 3) of the terminal ileum partly emptied of barium revealed the normal mucosal pattern one observes when the mucosa is faintly coated with barium. At this time fluoroscopic examination of the chest was negative. The Mantoux test was negative. The hemoglobin was 88 per cent, and the erythrocyte and leukocyte counts were normal.

## Comment

In this case of ileitis, the appendix was involved with a mild inflammatory reaction diagnosed appendicitis by the pathologist. A slight involvement of this nature is unusual but it could be secondary to or associated with the primary disease process in the terminal segment of the ileum. The appendix cannot be justly accused of being the causative agent of the disease process in the ileum nor can the spontaneous recovery be attributed to the removal of the appendix. Crohn[2] states that in at least 33 per cent of his cases the appendix had been removed at a pre-

vious operation without affecting or inhibiting the course of the ileitis. In retrospect, it is probably best not to remove the appendix since the danger of establishing an external fistula is great in a disease characteristized by a tendency to fistula formation.

Crohn[2] and Mixter[4] recommend conservative management as the treatment of choice in the acute stage of regional enteritis. With the patient on a strict medical regimen, it is possible that a complete regression of the disease may take place spontaneously.

After a few months of careful medical management, if the disease progresses to the early ulcerative stage where only slight fibrotic changes have occurred, there is still an even chance that a complete regression may take place if the more conservative surgical procedure, a short-circuiting operation, is performed. Crohn[2] says that in a series of twenty cases in which a short-circuiting operation had been performed, usually an ileocolostomy with transection and exclusion of the diseased ileum, ten patients were well after a follow-up of two to three years. The ten other patients did badly and had to submit to resection. He claims that there is a higher operative mortality rate in subsequent resections than in primary resections.

In the chronic, advanced stages of the disease, with marked fibrotic and stenotic changes, fistulas, and extensive mesenteric adenopathy, all observers agree that a radical resection in one or two stages is indicated. Resection and primary anastomosis or anastomosis according to the modified Mikulicz procedure may be performed. A wide excision of the diseased bowel and its mesentery offers the greatest chance for a permanent cure.

### Summary

A case of acute regional enteritis involving the terminal ileum with spontaneous regression of the disease is reported. The diagnosis was made by observing the gross pathology at the time of operation, and further confirmed by characteristic roentgenographic findings. After nine months of medical treatment, the patient recovered completely and has remained well more than two and one-half years after the onset of the disease. Late roentgenologic studies disclosed a normally functioning ileum. A conservative medical regimen is advised in the treatment of the acute stage of regional enteritis.

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## EASILY OVERLOOKED CONDITIONS OF THE BACK AND SHOULDER GIRDLE: THEIR RELATION TO PHYSICAL THERAPY*

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PATIENTS who have lesions of the spinal column and surrounding structures frequently are referred to hospital departments of physical therapy. For this reason it seemed wise to point out six of the most important of these lesions and to describe the condition, the affections for which it is commonly mistaken, the usual signs and symptoms and the relation of physical therapy to its management. This material was prepared first in the form of an exhibit, but interest in it was sufficient to encourage us to submit the same material in the form of an article.

The six conditions which we will discuss are: (1) coccygodynia due to muscle spasm, (2) fibrositis of the back, shoulder or neck, (3) hypertrophic arthritis of the cervical portion of the spinal column with secondary radiculitis, (4) protruded intervertebral disk, (5) scalenus anticus syndrome and (6) spondylolisthesis. These conditions are often mistaken for similar, more common lesions, and we feel that one should learn to recognize them and know their management.

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### Coccygodynia

In the presence of coccygodynia the coccygeal region is painful; this is often caused by spasm of the levator ani, coccygeus and piriformis muscles. Coccygodynia of this type is commonly mistaken for coccygeal injury, sciatic neuritis, intrapelvic lesions and lumbago.

Fig. 1. Method of internal massage for relief of spasm of levator ani, coccygeus and piriformis muscles. (After Thiele.[1])

The coccygeal region may be tender; and tonic spasm and tenderness of the levator ani, coccygeus and piriformis muscles may be present. An acute injury such as fracture or dislocation of the coccyx is not found. There may be sciatic and supragluteal tenderness at times and patients tend to walk stiffly and to sit on one buttock. The symptoms are pain in the coccyx and/or supragluteal region which may or may not extend down the back of the thigh. These symptoms are worse when the patient is sitting and are relieved if he lies on his side.

*Relation of physical therapy to management.*—There is a vicious cycle, pain, muscle spasm; more pain, more spasm. One should use radiant heat or diathermy and massage to the lower part of the back, coccygeal region and gluteus muscles. This should be followed by a special type of internal massage performed according to Thiele's technic[1] (Fig. 1) as follows: Insert the full length of a finger into the rectum with its flexor surface across the levator ani and coccygeus muscle, and its tip on the piriformis muscle. Massage in the direction of the long fibers as a strop is stroked by a razor. Massage lightly at first and increase the pressure at subsequent treatments. If improvement does not take place after four to six daily treatments, seek orthopedic or other consultation. Thiele[1] has reported that 60 per cent of his patients were cured, and 33.7 per cent definitely improved.

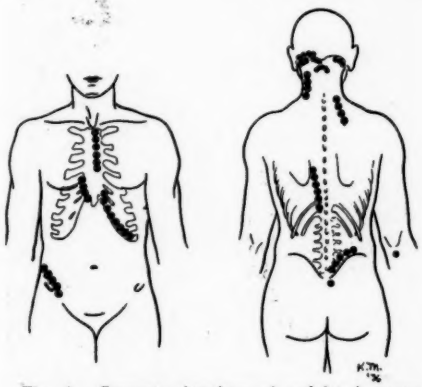

Fig. 2. Common situations of nodules in cases of fibrositis in the back. (Courtesy of Dr. C. H. Slocumb.[3])

### Fibrositis of Back, Shoulders or Neck

The lesion is a primary infectious chronic inflammation involving the white fibrous tissue of the fasciæ, aponeuroses, sheaths of muscles and nerves, ligaments, tendons, periosteum and subcutaneous tissue[2,3] (Fig. 2). In the neck or shoulders the lesion is often mistaken for brachial neuritis, cervical arthritis, migraine or occipital headache. In the lumbar region it may be confused with sacro-iliac disease, sciatic neuritis, atrophic arthritis or myositis. In both regions it is frequently diagnosed as chronic nervous exhaustion.

The usual signs of fibrositis are palpable indurations, fibrous thickenings and nodules in the muscles or fasciæ, associated with tenderness, swelling and muscular hypertonicity. The symptoms are muscular and periarticular pain and stiffness, particularly morning stiffness and "jelling" (stiffness after a period of inactivity), fatigue, aching and chronic lack of energy.

*Relation of physical therapy to management.*—Radiant heat and firm massage applied directly to the indurations and stretching exercises are indicated. More than 80 per cent of patients who

Fig. 3. Cervical portion of the spinal column; hypertrophic lipping of cervical vertebræ with narrowing of an intervertebral space in a case of severe secondary radiculitis.

continue such treatment for many weeks report lessening of the severity and frequency of flare-ups of pain and stiffness. Ordinary massage is of little or no value. Other methods of treatment must be used in conjunction with continued physical treatment to combat the frequent recurrences.

### Hypertrophic Arthritis of Cervical Part of the Spinal Column

The lesion is a hypertrophic marginal lipping of the cervical vertebræ with narrowing of one or more intervertebral spaces[4,5,6] (Fig. 3). Frequently, a secondary radiculitis is present. The condition is often misdiagnosed as brachial neuritis, angina pectoris, cervical rib, fibrositis or arthritis of the shoulder.

The signs of hypertrophic arthritis of the cervical part of the spinal column are tenderness and limited motion of the neck, tenderness along the affected nerve and atrophy of the affected muscles. The symptoms are primary pain and stiffness of the neck which is often relieved by traction or forward flexion and secondary segmental neuritis such as pain in the shoulder, arm, pectoral, or precordial region. Symptoms directly referable to the cervical part of the spinal column may be lacking. There is often weakness or tingling of the hands.

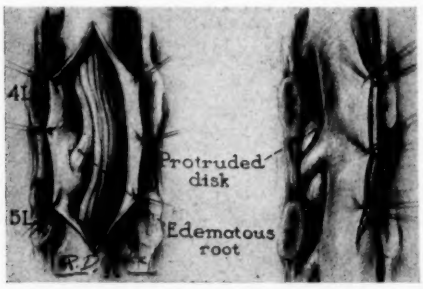


Fig. 4. Appearance at time of operation of a protruded intervertebral disk. (After Love and Camp.[7])

*Relation of physical therapy to management.*—Treatment is largely by physical means. Radiant heat, diathermy or roentgen therapy, followed by massage and cervical traction, is often beneficial. If secondary segmental neuritis is present, one should always consider the use of cervical traction. It may give dramatic relief. A Sayre's head sling or homemade head sling may be used for traction. A Thomas collar may help to maintain traction. Soft rubber soles and heels will often relieve the patient of discomfort by preventing jarring. Massage of the muscles of the neck and lightly forced rotation of the neck performed according to Hanflig's technic[5] may be applied during traction. Manual traction and rotation of the neck are sometimes helpful.

### Protruded Intervertebral Disk

The lesion is a protrusion of one or more intervertebral disks into the spinal canal[7,8] (Fig. 4). In such cases a diagnosis of intraspinal neoplasm, sciatic neuritis, lumbosacral strain, sacroiliac disease, spondylitis, fibrositis or lumbago is encountered frequently. When a protruded intervertebral disk is present, the Lasègue sign may be positive, the Achilles-tendon reflexes diminished, the sciatic or other nerve roots tender, total protein content of the cerebrospinal fluid increased or the protruded disk visualized in the roentgenogram following injection of iodized oil into the intraspinal subarachnoid space. All the known signs may be found in other conditions.

The chief symptom is intermittent root pain,

which is often unilateral, sharp and shooting, is usually in the sciatic nerve, and is often described as being "like an electric shock." The pain is aggravated by coughing, jarring or sneezing. It may be precipitated by tension on the involved nerve. Occasionally there is numbness and weakness.

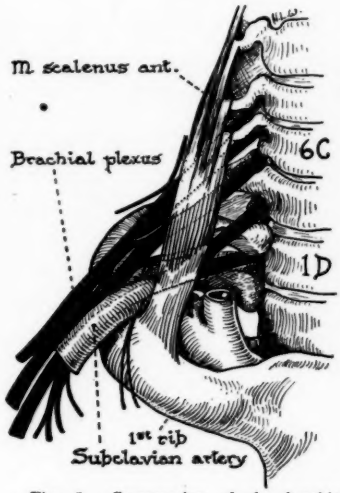


Fig. 5. Compression of the brachial plexus and subclavian artery by a hypertrophied scalenus anticus muscle. (After Spurling and Bradford.[8])

*Relation of physical therapy to management.*—In the presence of intractable sciatic neuritis one should suspect a protruded disk. Neurologic and roentgenologic studies may reveal its presence or absence. If a protruded disk is present, physical measures should be discontinued and the disk should be removed surgically. Flexion of the spinal column may cause a protruded disk to be drawn back into the intervertebral space, while hyperextension of the spinal column may cause increased protrusion of the disk. This fact may explain the occasionally reported sudden relief or severe aggravation of sciatic pains during the unskilled manipulation of cultists. There is probably more danger of aggravation since most manipulations by cultists are said to be performed with the spinal column in hyperextension. Any manipulation is dangerous and can produce no permanent relief.

### Scalenus Anticus Syndrome

This syndrome is produced by compression of the brachial plexus and the subclavian artery by a contracted, hypertrophied or anomalous scalenus anticus muscle. Compression usually occurs on one side only[9] (Fig. 5). The condition may be mistaken for brachial neuritis, cervical rib, segmental neuritis secondary to hypertrophic cervical arthritis or for fibrositis.

Fig. 6. The appearance of the back in spondylolisthesis showing the grooved lumbar portion of the spinal column and prominence of the erector spinæ muscles. (Courtesy of Dr. H. W. Meyerding.[10])

Signs present in scalenus anticus syndrome may be tenderness of the scalenus anticus muscle, pain on pressure above the clavicle, diminution of the radial pulse on deep inhalation and on turning the head toward the involved side and obliteration of the radial pulse on pressure over the scalenus anticus muscle. The symptoms are pain, muscle weakness and paresthesia which occur chiefly in the region of the ulnar nerve, but also may occur in the distribution of the median and radial nerves.

*Relation of physical therapy to management.*—One should suspect this lesion in cases of intractable pain of the brachial nerve. Application of a figure-of-eight bandage to the shoulders, elevation of the elbow in a sling or having the patient lie with arms above his head may cause relief of pain. Operative section of the muscle may be necessary to relieve the symptoms.

### Spondylolisthesis

The condition consists of a forward and downward lumbosacral or lumbar vertebral subluxation. It usually follows trauma.[10] It may be misdiagnosed as postural backache, sacro-iliac

disease, sciatic neuritis, lumbosacral arthritis, railway spine or lumbago.

The deformity is illustrated in Figure 6. The patient often has a grooved lumbar part of the spinal column, shortened torso, abdominal crease and lordosis associated with spasm and prominence of the erector spinæ muscles. The symptoms are pain, stiffness and weakness in the lower part of the back, sacro-iliac region, hips and legs. The symptoms are relieved by recumbency. There are no symptoms in 10 per cent of cases.

*Relation of physical therapy to management.*—In 10 per cent of the cases no symptoms occur and observation only is required. In 17 per cent spinal fusion is needed. In the other 73 per cent combined orthopedic and physical therapeutic management is required. One should attempt to reduce the deformity by traction and to prevent recurrence by the application of a cast. A "rocking chair belt" may be used for support. Radiant heat and sedative massage, applied to the back, tend to relieve pain and muscle spasm. Although this is probably a congenital defect, when mild it should be treated as a postural backache. The utilization of exercises to decrease pelvic obliquity should be considered.

## Conclusions

Knowledge of the six conditions under consideration, which are apparently much more common than is generally realized, should tend to establish the diagnosis in a larger percentage of cases and to aid in the physical therapeutic management.

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# PREGNANCY AND CHILDBIRTH AMONG THE NORTH AMERICAN INDIANS*


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AUTHENTIC information regarding the manners and customs of the Indian tribes that inhabited the North American continent on the arrival of the European whites is considerable and varied, and from the aggregate it is possible to reconstruct a fairly accurate picture of the daily routine of the lives of the Indians as they were influenced by location and environment.

While all tribes had many customs and beliefs in common, the language of each major division was distinct (though frequently dialects existed) and manners and customs in general conformed to the pattern of the parent group.

Concerning the customs pertaining to the management of childbirth, reliable information is meager from the fact that competent observers were rarely privileged to witness the act of labor, since the Indian woman was herself by custom and tradition secretive about the act, and members of the tribe were no less so about giving out information pertaining to a natural process which they considered most private. Even the Jesuits, who in their zeal to make converts, often at the risk of their lives, lived in close contact with Indians for long periods, have left us little or no record of customs and practices pertaining to childbirth.

Although the Indians of the east were the earliest to be contacted by the whites, their life was nomadic, and doctors who might have been sources of information were relatively sparse even in relation to the white population. It is not surprising therefore that no records pertaining to this subject are available.

*Address of retiring president of Minnesota Society of Obstetrics and Gynecology, Minneapolis, April 29, 1939.

The scant information available is derived chiefly from letters, diaries and reports of army officers and Post surgeons whose contact with nearby Indian tribes of the west furnished the source of information on this subject.

It is reasonable to conclude that while differences in methods and practice were common among the various tribes, in the main their plan of procedure followed a rather uniform pattern and it is interesting to note that in comparison with customs and practices of primitive tribes the world over, there was a surprising similarity.

In the consideration of this subject I shall confine my attention to those groups of nomadic tribes of Indians that inhabited the middle and north central west, and will not include the customs of those tribes that lived in the larger permanent communities of southern latitudes, which depended in a large measure on the products of agriculture for their living.

The plains Indians and all those who depended largely on game animals and fish for their food of necessity lived in small groups in isolated villages, the entire group numbering at most a few hundred inhabitants. Only on special occasions, as for hunting or tribal council, were they accustomed to assemble in larger groups. In winter they lived in permanent camps, the site being chosen for its advantages, usually a secluded spot on the banks of a stream along which were to be found abundant supplies of wood and where water was readily accessible.

In summer the band changed camp location frequently, choosing a site in a location favorable for the contemplated activities of the band, whether for hunting or fishing, the gathering of fruit or for the growing of vegetable crops, which among plains Indians was not an important activity.

In order to get an intelligent approach to this subject it is desirable to reconstruct the pattern of the routine daily life of the Indian woman, from childhood to the age of puberty, soon after which she married and bore children.

From earliest childhood the relation of the mother to the child was most intimate and she alone cared for the baby until it could walk, never permitting it to be out of her sight.

Children were taught early the lesson of subordination by the mother.

If the baby rebelled and cried the mother made use of a very simple and effective method of discipline by simply clapping one hand over the baby's mouth and with the other hand grasping its nose. The astonished baby, gasping for breath, would cease its crying, and if on relaxing her hold it attempted to cry again, the process was repeated. Under this discipline the baby soon learned that silence was golden and that it could expect no sympathy from the mother.

The girl soon after she could walk began to help her mother in light tasks about the lodge. As she grew older she was required to assist in cooking, in making and mending clothing, gathering wood and bringing water and was soon graduated into that round of wearisome labor which was to be her lot.

As a girl her work was mainly in and about the family lodge, where she was under the watchful eyes of her parents.

She was never sent out alone to cut or bring wood or water from a distance, as for an unmarried girl to be found away from her lodge alone was to invite outrage. She might go on these errands in the company of her mother, but as a rule all heavy work was done by older married women. She was taught early to do the ornamental bead and quill work and the finest specimens of this art on moccasins and clothing were samples of her handicraft.

The Indian girls even in northern latitudes were precocious and matured early. Of the plains Indians, according to Colonel Richard I. Dodge, girls began to attend dances and social gatherings at the age of eight or ten and at this age many were comely and attractive and were quite aware of their charms. The girls reached the age of puberty at about the age of ten and in the bloom of youth her attractiveness soon brought her a suitor and she married.

It is this phase of her life that engages our attention at this time.

After her marriage the lot of the Indian woman was one continuous round of drudgery. Her daily routine was somewhat as follows. In March, as soon as the snow was gone, in addition to cooking and mending clothes and caring for the children, she gathered firewood. If beans, maize or vegetables were raised it was she who prepared the soil, planted, cultivated and harvested the crops.

On breaking camp it was the women who did all the work taking down the tepees, gathering

up and transporting all their belongings and setting up camp in a new location.

It was the women who skinned and butchered the game animals that were brought into camp, and in the days when buffalo roamed the plains the women followed the hunting parties, skinned and cut up the carcasses where the animal had fallen and often carried the meat into camp. It fell to her lot to cure and smoke the surplus of meat or fish that was brought into camp and to store it away for future needs. It was she who laboriously prepared and tanned the hides, which afterwards she fashioned into clothing and shelters.

As a result of this hard life and constant work, the Indian woman before she had passed her teens had lost her early freshness and it was impossible from appearance even to approximate the age of an Indian woman. One of eighteen years might look as old as her mother of thirty-five.

The average age attained by the Indian woman of the plains tribes was thirty-five to forty years. That attained by the men, owing to their constant warfare and accidents of the chase, was even less. Of course a few individuals attained a greater age.

At this early date, however, the average life expectancy among civilized peoples was scarcely more, but in comparing them with the Indians we must take into consideration the fact that this low average duration of life among whites was due in a large measure to the very high mortality which prevailed in infancy and childhood from acute infectious diseases, from which the Indians in their primitive state, until contacted by whites, were exempt.

The Indian mother nursed her baby for at least two years and only in case of failure of the mother's milk was the life of the baby endangered, and even here the deficiency was often supplied by other nursing women of the band.

According to Colonel Dodge, the Indian woman, whether from lack of suitable food or from constant drudgery, though perfectly healthy, was not prolific. Other observers confirm this statement. The family of even four children was rare and a few were childless. The average in most tribes was scarcely more than two children per mother.

Children were highly prized and earnestly desired, especially by the father, for whom the girls constituted a source of revenue when they reached the marriageable age.

Abortion was rare among the primitive plains Indians. Polygamy was generally practiced and three or four wives were common, all living together in harmony in one lodge. The wife who had the most children was the most honored, but not always the most favored.

The custom of pleural marriages was no doubt in a measure responsible for the small number of children per mother, though Catlin thought it was due to the long period of lactation practiced, thus lengthening the interval between pregnancies. Just what influence the arduous life of the Indian woman, with often insufficient food, had to do with fertility is not known. Their food, according to the locality in which they lived, was meat, fish and vegetables, often eaten raw, and nuts, seeds and fruits. Few areas furnished all these supplies, but as the Indians ate every part of an animal and the flesh of almost every animal, as well as every edible plant in their locality, they came nearer to a balanced ration than might be supposed. It is, however, fair to assume that they did at times suffer from malnutrition from insufficient food or errors in diet.

It seems more likely that the limited number of children per mother was the result of the practice of polygamy, the younger and more attractive women supplanting the older and commanding the attention of the husband, although other mentioned factors no doubt played a part.

Sterility among the plains women, according to accounts, was not common, and venereal disease was unknown before contact with the white race.

Among the plains Indians the pregnant woman received but little consideration and continued to work until the onset of labor.

It is of interest to note that the Indian woman enjoyed an immunity from most of the complications and dangers that beset women of civilized peoples during pregnancy. Spontaneous abortion, ectopic pregnancy, placenta previa, and premature separation of the placenta were practically unknown.

Their freedom from venereal disease and their strenuous outdoor life contributed to the development of healthy and well developed bodies.

Multiple pregnancies, while occasionally mentioned as occurring among Indian tribes, appear to have been far less common than among

whites. Catlin states that on diligent inquiry among the many tribes he visited about the year 1835, he failed to hear of a single instance of twins. Other writers, however, mention their occurrence and among some tribes it was considered an omen of good luck, while with others it was bad medicine.

Toxemia and eclampsia appear to have been unknown among the Indians in their primitive state and it is probable that their mode of life and restricted diet were important factors contributing to their immunity.

While salt was commonly used by Indians when it was easily obtainable, it does not appear to have been an indispensable article of diet. Colonel Dodge, an authority on the habits and customs of Indians, states that even in their wildest state all the Indians he had ever known used salt with their food when they could get it. Sodium chloride is so widely distributed throughout the land that it could be easily obtained in almost every locality.

On the other hand, Frances Densmore, an authority on Chippewa customs, writing of the primitive Chippewa Indians, states that salt was unknown in the early days.

Also Parkman, who drew his information from the Jesuits who lived among the Hurons, states that maize was the staple article of their diet, which they cooked and ate in various forms without salt. He also relates an incident relative to the Iroquois tribes who, on their first contact with Jesuit priests who had come among them, marveled at the strange custom of putting salt on their food, and, being noted for their sense of humor, debated among themselves the question as to whether the flesh of a white man who ate salt on his food would taste salty.

At all events from information at hand, salt was used sparingly, if at all, by the primitive Indians and its use was governed to some extent by easy accessibility.

The sodium chloride necessary to maintain the balance in the system was present in the food they ate. It is said to have been a common practice among warriors to drink the blood of a freshly killed animal. Since animal blood is rich in sodium chloride, may it not have been their hunger for salt that gave rise to this practice?

From the foregoing we may fairly assume that the Indian woman lived on what was the equivalent of a salt-free diet and if the opinion of De Snoo is correct, that on a salt-free diet a woman never develops toxemia or eclampsia, might this custom explain their immunity from toxemia?

The act of labor among primitive plains Indians assumed no such importance as among civilized peoples. Generally speaking it was short, uneventful and was accomplished in privacy, often in the absence of an assistant.

The average duration of labor among primitive tribes was from one to two hours with perhaps an additional hour for women giving birth to their first baby. From accounts at hand the difficulties and complications so frequent among civilized peoples were rare. Thus we read accounts of Indian women overtaken with labor pains while on march from one camp to another in which the woman simply stopped by the side of the trail and in the seclusion of a clump of bushes gave birth to her baby, made its toilet, and caught up with the caravan, so short and uneventful was the labor. But from such accounts it must not be concluded that births were always so easy and uneventful. Among civilized peoples short and easy labors are by no means infrequent and who among us has not had the experience of arriving at the home or hospital only to learn that the birth had taken place before his arrival?

The freedom from complications of the Indian woman was probably due to several factors which contributed to a short and easy labor.

The Indian woman from early childhood was favored by her open-air environment and was habituated to arduous duties and arrived at maturity with a healthy and well developed body. As before mentioned, as a baby she was nursed at her mother's breast for the first two years of her life at least among the plains Indians. Rachitis was unknown as was also pronounced deformity of the pelvis from other causes. Her strenuous life, and frugal diet which at times amounted to restriction bordering on starvation, regulated and restricted the growth of the fetus to limits which insured an easy passage through the bony pelvis. Post-maturity with overgrown babies was unknown.

According to Hrdlicka, measurements of a large group of skulls of Indian tribes showed that while the cranial capacity of the tribes differed, the average capacity was about the same

as of the white races, namely about 1,360 g. for males and about 200 g. less for women.

As compared with the white race, Hrdlicka notes a difference in shape of the cranium of most tribes conforming to the meso-cephalic type with low vault, large face and jaws, and median high orbits.

Outstanding in cranial capacity according to Parkman were the Hurons and Iroquois, both of the same racial stock, but the increased capacity was chiefly in the occipital region and base of the skull, while in other respects the shape of the cranium conformed to the predominant type of the various tribes described by Hrdlicka.

In contrast to certain white types the biparietal diameter was comparatively less.

Malpositions, faulty presentations and positions constituted the most serious hindrance to delivery among Indian women. But the average percentage of deviation is so small as to constitute a rather infrequent complication.

When it is recalled that vertex presentations occur in 95 per cent of all cases, it is safe to conclude that of the remainder, few indeed caused trouble.

Granting, for reasons previously stated, that the Indian child was small at birth and that the shape of the head was favorable and the cranial bones soft and yielding, most of the vertex malpositions likely to cause trouble other than the rare brow or face presentation could be left out of consideration.

As for breech presentations, while they constituted a possible danger for the baby, they had less significance for the mother.

Transverse presentation, occurring about once in 200 cases, was a real menace to the life of both mother and child. This much dreaded complication was one which seldom yielded to the expulsive forces of labor and for which neither the help of assistants nor the magic of the medicine man availed when the shoulder was impacted or an arm was prolapsed.

Sometimes manipulation, or the application of massage over the abdomen at the beginning of labor, which was a common practice, corrected the position, causing one or other pole of the fetus to descend into the pelvis. If this failed, the woman usually died undelivered.

Fetal deformities appear to have been less common than in the white race and, according to Hrdlicka, hydrocephalus was unknown.

Although most Indians made use of herbs and the bark and roots of certain shrubs and trees in various disorders for their healing properties they were rarely used during labor. The Skohomish sometimes gave a tea of uvi ursa leaves just before the child was born. The Uinta woman was encouraged to drink copiously of hot water. The Crow Indians of Montana are said to have used a decoction of various roots and leaves. The Winnebagos and Chippewas gave a decoction of roots believed to relax the system and to promote the birth of the child.

In difficult or delayed labors massage and pressure with the hands over the abdomen was practiced by most Indian tribes during labor and by some even before labor during the latter part of pregnancy.

This practice had a rational basis and no doubt sometimes corrected malpositions if done before or early in labor. Pressure over the abdomen was the application of the principle of Kristeller's maneuver, and massage over the abdomen served to stimulate the uterus and to increase the frequency and force of the pains, all of which were rational procedures. Attempts at internal manipulation were never made, for they suggested no means of assisting delivery to the Indian who was ignorant of the cause of the delay.

With most tribes the act of delivery took place in the privacy of seclusion. In summer, the Indian woman, on recognizing the approach of labor, would steal off into the woods or to some secluded spot in a thicket or by the side of a stream or lake, if such convenience was at hand, either alone or with an attendant, usually a female relative or friend.

Among northern tribes in winter and with a few others, by custom, a temporary shelter was erected in the vicinity of the lodge, usually a wicke-up or shelter made of brush. The ground within was strewn with small branches, grass or leaves or in the absence of these a piece of cloth or blanket was spread on the ground.

Immediately after labor the mother bathed herself and baby, if water was at hand, and with her newborn returned to the family lodge and resumed her usual occupation. This seems to have been the universal custom of most tribes of north central and plains Indians.

Any assistance rendered was of the simplest character and consisted entirely of external ma-

nipulations and support of the patient in whatever position she might assume. Expression was made by an assistant standing behind the patient, her arms encircling the abdomen with the hands clasped in front of and over the fundus of the uterus. As a substitute for this sometimes a bandage was applied over the abdomen just above the fundus of the uterus, the ends of which were brought together behind the patient and held by the assistant.

In some tribes it was the custom for the woman to bend over a pole or rope in such a way as to make pressure over the uterus. Others applied a belt about the abdomen just above the fundus of the uterus, which was tightened from time to time with the view of forcing the uterus down. This was called the squaw belt. Another method in the attempt at promoting delivery in difficult cases was leaning on a staff firmly planted in the ground, making pressure over the uterus. This procedure was also frequently used to hasten the expulsion of the placenta.

In some tribes the woman assumed the prone position with a pillow under the abdomen making pressure over the uterus. Others suspended the patient by a rope passed underneath the arms and thrown over the limb of a tree. In this position the assistant with arms encircling the abdomen made pressure over the fundus of the uterus.

If these methods failed in difficult labors, they were supplemented by the incantations of the medicine man and other means of acting on the imagination of the patient.

Post surgeons were called only in the most desperate cases where all other efforts at assistance had failed.

Various positions were assumed by the woman in labor usually following the whim or natural inclination of the patient.

Probably the most common was kneeling and clinging to a tent pole, the body inclined forward or to a rope or horizontal staff with body inclined backward.

Among many, the squatting posture was a favorite position, notably with the Pawnees, Nez Perce, and Gros Ventres. Others assumed the semi-recumbent posture in the lap of an assistant on the floor.

A favorite position with the Brule Sioux and Canadian Iroquois was standing erect, clinging to the neck of an assistant.

Among others the patient was tied to a tree or suspended from the limb of a tree, while others adopted the knee-chest posture.

Other aids occasionally employed were steam baths, occasionally emetics. Nauseating decoctions were employed but their use seems to have been sparing.

With most tribes of plains Indians the third stage of labor was short, the placenta being delivered soon after the birth of the child.

The procedure in most common use was to make pressure over the uterus with the patient in the same position in which she was delivered. In case the third stage was unduly prolonged, massage and kneading of the uterus was practiced.

Some tribes made a routine practice of the squaw belt and frequently gentle traction was made on the cord. In case of delay the patient was raised to the erect posture and manipulation from above and traction on the cord were continued. Traction on the cord was always done with caution, experience having no doubt taught them the danger of tearing off the cord, thus further complicating delivery of the placenta.

It is significant to note that efforts at delivery of the placenta were limited to external manipulations, massage or pressure over the uterus, the Kootenais alone being reported to have practiced internal manual delivery of retained placenta if other methods failed.

Usually the cord was not severed until after the expulsion of the placenta though a few are reported to have cut the cord as soon as the child was born and the end of the cord was then grasped and held lest it should retract into the vagina. The cord was usually severed about a foot from the umbilicus and a common practice was to saw it through with the sharp edge of a shell. The cord was never ligated.

Hemorrhage accompanying or following the third stage appears to have been rare. The treatment commonly applied was to souse the patient in the cold water of the nearest stream, or, lacking that, cold water was forcibly dashed over the abdomen, the process being repeated until the hemorrhage ceased.

Immediately after the delivery of the placenta

the Apaches raised the patient to her feet and compelled her to walk about for half an hour or so to favor the free discharge of retained blood. This practice was also common among the Dakotahs and most tribes of the northwest.

Often the squaw belt was worn for some days after delivery.

Most of the plains Indians observed no period of rest following delivery, and the woman resumed work as usual the same day or day after the birth.

Puerperal infection appears to have been rare among plains Indians according to reports and this can be attributed in part to the custom of isolation from the family lodge to a fresh clean shelter during the act. A far more important factor was the avoidance of internal manipulation during labor to promote delivery, in the absence of contact with the external genitals by hands or agencies which might carry infection.

Now, let us consider briefly the effects of contacts with white civilization on pregnancy and labor among Indians. There is much evidence to show that the difficulties of childbirth increased in proportion to the intimacy of their association with the white race. Intermarrying with whites resulted in larger babies with contours of heads that did not conform to the shape of the Indian pelvis and this led to a marked increase of malpositions. Other conditions such as the less strenuous life and the partial relief from hardship of Indian women whose contact with civilization insured a more liberal and constant supply of food as compared with the often scant supply of the Indian living in the primitive state must also be taken into consideration.

Complications unknown to Indians living in their primitive state soon afflicted Indian women so that there is now comparatively little difference in their susceptibility to diseases common among the white race.

In order to check on the subject of pregnancy and childbirth of primitive Indians as compared with present-day Indians living on the reservations, I recently sent a questionnaire to government doctors on the reservations and these are some of the replies I received.

1. *Admixture of white blood* among Indians on the reservations ranged from 25, to 40 or 50 per cent. It is much less among the Indian tribes of the Southwest.

2. *Venereal disease.* Both gonorrhea and syphilis are prevalent, ranging from 15 to 25 per cent. The percentage is relatively higher the closer the Indian lives to white communities.

3. *Complications of pregnancy.* About half the replies received report ectopic pregnancy and placenta previa as uncommon and the remainder about the same as whites.

4. *Complications of labor.* Two report malpositions as common, and two as rare.

5. *Toxemia.* All report it as less than among whites.

6. *How cared for at delivery?* Fifty to 100 per cent delivered in government hospitals; the remainder by midwives.

7. *Puerperal infection* is reported as not common.

8. *Congenital deformities* are reported as rare.

9. *Twin pregnancies* are reported as uncommon by two and as about the same as whites by two.

10. *Sterility* is reported as not common.

11. *Tumors of the uterus* are reported as less common than among whites. This applies to both fibroids and carcinoma.

12. *Tumors of the ovaries* are reported as a little less common than among whites.

Exhaustive studies have been made of the susceptibility of the Indians to malignant disease, and, while the results have at times been conflicting, practically all agree that among Indians living in present-day conditions cancer is less common than in whites. There is reason to believe that it was much less among primitive Indians as in most instances they died before the cancer age, the average age reached being thirty-five or forty years.

From these reports derived from Indians living on the reservations the trend points to a marked increase in their susceptibility to the white man's diseases, and this raises the question whether this is due to the admixture of white blood or to changes in environment and living conditions which today approach the living conditions of the poorer class of whites in sparsely settled rural districts. Probably both factors have contributed to bring about this change.

Certainly the subject is intriguing and is deserving of further study.

# INTESTINAL OBSTRUCTION: WITH A STATISTICAL STUDY OF THE ASBURY HOSPITAL CASES*

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"It is a surprising thing," stated Dr. C. J. Miller in 1933, "that with all our knowledge and advancement in the subject of surgery and medicine, the mortality of obstruction has not been reduced more than 50 or 60 per cent over that of a number of years ago. Our methods of diagnosis, the symptoms, and x-ray make the diagnosis of obstruction fairly accurate and quickly in nearly all cases. What, then, are the causes or cause of death in obstruction?"

## Causes

In reviewing the literature on ileus, a great variety of opinions were found in regard to the cause and effect of intestinal obstruction. As to the causes the following is presented as a clinical classification:

1. Mechanical obstruction
   - A. Narrowing of the lumen
     - (1) Strictures of the bowel wall
       - (a) Congenital
         - (1) Atresia
         - (2) Imperforated anus
       - (b) Acquired
         - (1) Inflammatory
         - (2) Traumatic
         - (3) Vascular
         - (4) Neoplastic
     - (2) Obturation
     - (3) Compression from without (especially pelvis and retroperitoneal duodenum)
   - B. Intestinal obstruction due to adhesions and bands
     - (1) Congenital
     - (2) Inflammatory
     - (3) Neoplastic
     - (4) Traumatic
   - C. Hernia
     - (1) External hernia
     - (2) Internal hernia
   - D. Volvulus
   - E. Intussusception
   - F. Errors in development of gut which give rise to intestinal obstruction
2. Intestinal obstruction due to nervous unbalance (physiological obstruction)
   - A. Inhibition (paralytic ileus)
   - B. Spastic or dynamic obstruction
3. Vascular obstruction
   - A. Intestinal obstruction due to mesenteric thrombosis or embolism

## Symptoms

In the years up to 1931 numerous theories had been advanced to explain the symptoms of acute intestinal obstruction. The following are the principal theories:

1. The intoxication theory. This theory presupposes that a toxin is formed within the bowel which is absorbed into the blood stream producing characteristic signs and symptoms.
   - (A) Toxins resulting from putrefaction of stagnating food within the intestinal tract. This work was done by Albeck, Lepine, Mollier, Roger, and Garner.[3] There is relatively little evidence to support the theory that "intoxication" is the result of absorption of putrefaction substances. Putrefaction is relatively rare in the upper intestinal tract where the most marked symptoms occur following intestinal obstruction.
   - (B) Toxins arising from bacterial invasion of the obstructed gut. Murphy, and Brooks and his co-workers[8] found that a normal gallbladder could be obstructed without the production of any signs of intoxication. If, however, following obstruction and interference with the nutrition of the gallbladder, bacteria obtained from the intestines were introduced into the gallbladder, symptoms identical with those seen in cases of intestinal obstruction were observed. Fluid from such a gallbladder

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injected into another animal was also toxic. In 1931, Williams,[3] an English surgeon, advanced the theory that intoxication seen in intestinal obstruction and ileus associated with peritonitis was similar to, and probably dependent upon, a bacillus Welchii infection. They seemed to get some results from the use of immune serum and bacillus Welchii antitoxin.

(C) Intoxication resulting from the absorption of normal secretions in an abnormal way or secretions which have not been toxified. Draper[3] believed that most of the intoxications are the result of the absorption of duodenal as well as the pancreatic secretions before they can be detoxified by the ileal cells.

(D) Intoxication produced by the absorption of perverted intestinal secretions. Whipple and Stone[3] and their co-workers believed that in obstruction the normal function of the cells of the duodenum was lost and that they secreted a substance which was toxic.

(E) Bacteriemia—the theory that the symptoms of intestinal obstruction were due to the absorption of bacteria. This theory was not generally accepted even though Generisch[3] found that in experimentally produced intestinal obstruction, Bacillus coli could be found in the peritoneum or blood, or both.

2. Non-toxic causes

(A) Dehydration. It was considered by some that the symptoms of intestinal obstruction were due to other factors besides intoxication. The one theory that was most commonly accepted was that of dehydration. Dehydration is always present in those cases with persistent vomiting. It has been found that by withholding fluids by mouth and giving fluids intravenously and intramuscularly, the patient can be carried along for some time before collapse, whereas if this is not done they soon die. This rapidly occurs in high obstruction. In lower obstruction this may take place but it is a much later development.

(B) Blood changes. Because of characteristic blood changes such as decrease in plasma chlorides, increase in carbon dioxide combining power of the plasma, and increased urea nitrogen, it was thought by some observers that certain, if not all, symptoms and signs depend upon these changes.

In 1937, Wangensteen[4] stated that we have advanced considerably from the long held conception that obstruction is essentially a toxemia occasioned by the absorption of a chemical poison of the nature of proteose or histamine from the bowel. The lethal factor in the obstructions of the upper reaches of the small intestines was definitely shown to be loss of fluids and chlorides through the agency of vomiting. A duodenal fistula was found to be fully as perilous as an obstruction in this region. The old conception that high obstruction is the most vicious is not outmoded by the knowledge of what saline solution can do to replace fluids and minerals lost by vomiting, nor by the demonstration of the favorable effect of relief of distension in colonic obstruction.

### Effect

At the present time, the more important known physiological effect from obstruction is fluid and gaseous distention. The fluid consists of ingested liquids including saliva, gastric and pancreatic juice, bile and succus entericus. These have been estimated at 7,000 cubic centimeters per day (Rountree[4]). The chief source of gas is swallowed air, which is estimated at 70 per cent. The remainder of the gas is from fermentation and putrefaction in the bowel and that carried to the bowel through the blood. In consequence of the distention of the bowel, its wall becomes thinned, peristalsis is increased and propelling of its contents becomes ineffectual. The resistance of the intestinal muscle causes a colic-like pain.

Gamble[4] and his co-workers showed that the loss of electrolytes (sodium and chloride ions) was the chief factor in producing dehydration and that as a result of dehydration there was a concentration of the blood, with an increased concentration of the plasma proteins, and increased red blood cell count; also an increase in the viscosity of the blood. Hartwell and Hogue[3,4] and later Haden and Orr[3,4] demonstrated the physiological changes associated with dehydration and

with the chloride loss. They suggested that this loss might be responsible for the toxic changes which their animals evinced.

In simple obstruction of the ileum we do not, as a rule, have such a marked loss of fluid and electrolytes and the administration of saline does not produce such striking effects. This is probably explained by the fact that the function of the absorptive area is not so greatly compromised. In obstructions of the colon, particularly low obstruction, there is little vomiting or fluid loss and the changes in the chemistry of the blood and body fluids are of secondary importance. In acute intestinal obstruction with venous obstruction and hemorrhagic infarction of the bowel wall, blood loss may be quite marked. Animals with any great amount of strangulation of the small intestines soon become profoundly ill and die in a short time. That is before there is significant loss of fluids by vomiting or a marked decrease of blood chlorides.

Aird of England, from certain experiments, concluded that long loop strangulations, involving half of the small intestines, are primarily dangerous from an internal hemorrhage standpoint. While as yet the rôle of fluid loss in acute intestinal strangulation cannot be accurately defined because of the varying results obtained by different investigators, it seems quite likely that only in very extensive strangulation is it the cause of death. Blalock has demonstrated that it requires a loss equivalent to 4 per cent of body weight to produce death. This is in an average sized man equivalent to two and one-quarter liters.

A greal deal of work has been done in regard to the rôle distention plays in intestinal obstruction. The normal and obstructed intraluminary pressure upon the various portions of the bowels has been studied; also, its effect upon the bowel wall. It has been found that the colon tolerates a relatively high tension whereas the duodenum tolerates a much lower tension, probably because of the greater vulnerability of its blood supply.

The effects of distention on absorption are less clearly understood. The absorption of water, glucose and certain alkaloids from the obstructed bowel is delayed. Because of intestinal stasis absorption by way of the lymphatics seems to be increased. Gatch and Culbertson[3] believe that devitalization of the bowel wall causes a loss of power of selective absorption by the mucosa, and permits the passage of toxic substances present in the obstructed bowel. Elman[2] in his studies has reported clinical cases in which he found that the sudden release of obstruction was followed by a deterioration in the patient's condition, owing, he believes, to absorption of toxins through reopened mesenteric channels. There seems to be no doubt that toxins play a part in intestinal obstruction, but investigators are unable to agree upon its source, whether it is derived from the bowel wall or from the intestinal contents; also, as to its chemical nature. The part played by toxins in intestinal obstruction is not well defined at the present time. However, there is reason to suppose that some such factor must operate in strangulating types of obstruction with their early onset of circulatory collapse.

## Diagnosis

As previously stated, the diagnosis of intestinal obstruction is more rapidly and accurately made today than in the past. Fecal vomiting is practically synonymous with small intestinal obstruction.

The first question that arises is whether the obstruction is mechanical or functional, that is, spastic or paralytic. In mechanical obstruction we have the colicky cramp-like pains most intense at the height of peristalsis. The relation of pain and borborygmi is established by the stethoscope. In the paralytic type the pain is less colicky in character, the intestinal sounds are absent, or if present have no relation to the attacks of pain.

In the strangulating type of obstruction there is a rather abrupt onset with pain, as previously described, vomiting (particularly in high obstruction), increased pulse rate, low arterial pressure, cold clammy skin, and a rapid course so that the patient may be gravely ill in a few hours. The abdomen is tender and shows the signs of peritoneal irritation, localized and rebound tenderness, also muscle spasm. If these signs and symptoms are present, we feel fairly sure we are dealing with a strangulation type of obstruction in which the blood supply to the gut is involved. In simple obstruction, one in which the blood supply is not involved, the course is rarely so rapid and collapse is usually delayed for a considerable time unless the obstruction is very high. Tenderness of any degree is rare and on-

ly comes on much later when there may be interference with the venous return because of continued pressure.

As to the site of the obstruction, the history, onset, degree of vomiting and the general clincial picture help a great deal and in some cases establish very nearly the location. For example there is no gastric retention in colonic obstruction and fecal vomiting is always absent and vomiting is frequently entirely absent. Perforation of the colon due to the high tension occurs occasionally without vomiting. When we have considerable distention without nausea or vomiting, and without return of colored intestinal fluid upon gastric aspiration but accompanied by intestinal colic, we have an obstruction of the colon. Frequently, a rectal or vaginal examination will demonstrate the seat of the obstruction, or one may feel the collapsed loops of small bowel if the obstruction is high up and these have collapsed and fallen into the lower pelvis.

In obstruction of the lower end of the large intestine not only may the horseshoe-shaped outline of the colon stand out plainly, when the bowel is in rigid spasm, but even the pouches of the gut may be seen. When the cecum or lower end of the ileum is obstructed the distension is in the lower central region, and during spasm the coils of the small bowel may be either obliquely or transversely placed, the so-called "ladder pattern."

The most reliable findings in direct lower bowel obstruction are obtained by the use of the x-ray. It has been repeatedly shown that gas and fluid levels in the small bowel become characteristic in these direct lower bowel obstructions in three to six hours, and it cannot be emphasized too much that an early so-called "scout" plate be made.

It must be borne in mind that early diagnosis is very important. Donaldson,[1] in a review of the statistics, found that the mortality even in simple obstruction in those that lasted over forty-eight hours was very high (84.6 per cent); in those that were allowed to go over seventy-two hours the mortality was 100 per cent. When operation was done under forty-eight hours (average in his series was thirty-two hours) the mortality was only 12.5 per cent.

The differential diagnosis of obstruction of the bowel will not be discussed. However, it must be differentiated from such conditions as: acute enteritis, peritonitis, acute pancreatitis, mesenteric thrombosis or embolism, lead poisoning, and hernia.

### Treatment

Treatment must vary according to the type of obstruction involved. The most clear cut therapeutic indication is to restore the continuity of the intestinal tract, but in certain cases it may be advisable to achieve this end indirectly rather than by immediate operative procedure. In simple mechanical intestinal obstruction the first step in treatment is the replacement of fluid and electrolytes lost by vomiting. This loss may vary considerably. In high obstruction it may be great and in colonic obstruction, as a rule, it is very slight. Enough fluids should be given to insure a daily output of 700 c.c. to 1,000 c.c. of urine.

The second step is the relief of the distention of the obstructed loops and prevention or relief of the circulatory changes which follow in the wake of distention. It is here that one of the single most important advancements in recent years has been made by Wangensteen[4] and his co-workers. His method of a simple water-siphon suction apparatus which applies a negative pressure to an indwelling duodenal tube has been of incalculable value, and today it is in general use throughout the country.

There are two types of simple obstruction in which decompression of the bowel above the site of obstruction alone usually permits the continuity of the bowel to be restored. These types are: (1) simple mechanical obstruction occurring in the early postoperative period caused by fibrinous adhesions; and (2) late postoperative obstruction caused by fibrous adhesions. These were formerly treated by enterostomy, but Wangensteen[4] has definitely shown that the large majority are more satisfactorily treated by decompression without surgery. In the colon, if the ileocecal valve is competent, we have a closed loop obstruction and early relief of tension is urgently needed. A cecostomy or colostomy under local anesthesia is indicated.

Even in early simple obstruction preliminary decompression for a period of a few hours may greatly relieve the distention and thus aid in the operative procedure. It is generally con-

ceded that adequate blood transfusion is urgently indicated in all strangulating obstructions in which we have any significant blood loss, as indicated by increased pulse rate, low hemoglobin, and the condition of the patient in general. In short loop obstruction, blood loss is not important.

Fine[5] and his associates have investigated the use of oxygen in obstruction and have found that concentrations as high as 90 per cent can be used with satisfaction. They did not find that such high concentrations caused desquamation of bronchial epithelium and predisposed the patient to pneumonia as was formerly thought to be the case. By reducing the amount of nitrogen in the inspired air the nitrogen tension in the blood plasm is similarly decreased and nitrogen in the bowel lumen, which ordinarily does not diffuse readily through the intestinal wall because of the high tension of nitrogen in the plasma, slowly diffuses into the venous blood and is exhaled. This, together with an inlying duodenal tube to remove the swallowed air, is of great value.

Operative interference should be undertaken very early in short loop strangulations as perforation and peritonitis occur comparatively early. The viability of the bowel may be determined by the return to normal color of the affected loop, the presence of mesenteric pulsations and occurrence of peristalsis. When resection is to be done it is safer to exteriorize the loop and reestablish the continuity of the bowel later, when the general condition of the patient is improved. In strangulation, as in simple obstruction, the procedure which promises to give relief with minimal manipulation and with the least chance of peritoneal contamination is the safest. Sterility of the peritoneum must be preserved. Contamination or spillage is synonymous with failure.

## Summary

We are not drawing any conclusions in this paper. Much progress has been made in the diagnosis, treatment, and understanding of intestinal obstruction. X-ray has aided in the diagnosis of these cases and nasal suction (Wangensteen's method) has done much in the treatment of intestinal obstruction.

The parenteral administration of fluids and the use of high concentration of oxygen have reduced mortality. However, research and experimentation still remain to be done, especially as to the cause of death in these cases.

## PART II

In the preceding portion of this article the subject of obstruction of the bowel was dealt with generally and all parts of the intestine affected by this condition included. In the remaining portion of the paper, because of the nature of the material in an "acute" hospital and because only those cases definitely obstructed were chosen, our study automatically narrows itself down to a consideration of acute obstruction of the ileum which is subject to ileus following peritonitis, to adhesions with inflammatory areas, to handling during surgery, to volvulus of its loops and its mesentery and to some extent to new growths.

In the second part of this paper we included intussusception and strangulated hernias where clinical evidence of obstruction obtained.

The following group of statistics are made from the hospital records just as they appear there, reading from the front to the back of the record.

### Operated Cases of Obstruction of Bowels

(Asbury Hospital—1924-1931)

This group of cases numbered eighty-six, with fifty-seven cures and twenty-nine deaths, giving a 35 per cent mortality.

The working diagnoses made were: obstruction, appendicitis, cholecystitis, intussusception, volvulus, salpingitis, ovarian cyst, strangulated postoperative hernia, and various other surgical diagnoses of abdominal conditions appeared to the number of twenty.

The final diagnoses in this group were: obstruction, appendicitis, volvulus, strangulated postoperative hernia, peritonitis, mesenteric volvulus, cholecystitis, intussusception, ruptured appendix, and other surgical conditions obtained to the number of twenty-five.

The operations performed upon this group of patients where obstruction of the bowels was dealt with were: liberation of adhesions, appendectomy, enterostomy, ileostomy, reduction of strangulated hernia, reduction and repair of various other hernias, drainage of appendiceal abscess, salpingectomy, colostomy, reduction of intussusception, cholecystectomy, reduction of volvulus, suspension of uterus, resection of ileum, and other surgical operations in the abdomen to the number of thirteen.

The complications found were: paralytic ileus, obstruction of bowels, fecal fistula, peritonitis, infected wound, pneumonia, postoperative hemorrhage, separation of wound, gastric dilatation, toxemia, pulmonary embolism, and other medical and surgical conditions complicated this group to the number of ten.

Ages of the group ranged from one to eighty years with an average of forty-three.

Sex distribution showed females fifty-five and males thirty-one.

Autopsy diagnoses in the fatal cases followed by

postmortem examinations were as follows: peritonitis, obstruction, bronchopneumonia, cloudy swelling of the liver, kidney and spleen, paralytic ileus, postoperative hemorrhage, gastro-enteritis, dilatation of stomach, gangrenous appendicitis, coronary sclerosis.

Non-surgical decompression was used preoperatively and postoperatively in most of the cases. No nasal suction of the syphon and almost continuous type that is in use today was employed. The duodenal tube passed through either mouth or nose and irrigated by means of a syringe was used fourteen times. Stomach lavage was resorted to twenty-three times for relief of vomiting and distension. Other agents used for the purpose of decompression were: rectal tube, pituitrin, hot turpentine stupes, hot abdominal packs, milk, and molasses enemas, and other agents, for example cold abdominal pack and ergot dry heat were used once each. Enterostomy, a form of surgical decompression, was performed three times in addition to the previously named operations used for the relief of these patients.

Abdominal operations had been previously performed upon fifty-two patients in this group while thirty-four had had no surgical treatment. Eleven of the obstructions followed operations only a few weeks or days before. In eleven other cases obstruction occurred several months to two years after operation in and upon the abdomen. Thirty of this group had had previous operations two or more years before obstruction.

In this small group of bowel obstructions the list of previously performed operations were: appendectomy, salpingectomy, cholecystectomy, drainage of appendiceal abscess, ovariectomy, hysterectomy, myomectomy, obstruction, herniotomy, exploratory laparotomy, suspension of uterus, and drainage of ovarian cyst.

The symptoms listed on the records of this series of cases were: pain, vomiting, distension, nausea, tenderness, inability to move bowels or to pass gas from bowel, cramps, rigidity, palpable mass, hernia, spasm, chills, and reversed peristalsis.

A very high percentage of this group were diagnosed from clinical findings when first seen. However, the x-ray used in twenty-one cases was diagnostic nineteen times and negative twice. When there was a definite need of confirming other findings, x-ray furnished this information in nearly every case where it was used.

Review of anesthesia used in this earlier period of our study showed general anesthesia the choice in 50 per cent of cases, or forty-four times. Local anesthesia, no doubt, was given preference in bad risk cases, where it was used seventeen times. Spinal anesthesia, most excellent in obstruction cases, was selected thirteen times. Combinations of different types of anesthesia, one usually preceding the other, were used fourteen times.

The time from the onset of the obstruction to its relief varied from one to thirteen days, with an average of two days, this average time being short because many patients were relieved immediately by operation.

The number of days spent in the hospital by the patients in this group varied from one to seventy-four, with an average of eighteen days.

## Unoperated Cases of Obstruction of Bowels

(Asbury Hospital—1924-1931)

The number of patients with obstruction of the bowels so diagnosed and not operated upon for the reason that they recovered without operation or were beyond the help of surgery, was twenty-nine. Seven of these died and three came to autopsy, making the mortality 24 per cent and autopsy percentage 42.

The number of days spent in the hospital ranged from one to fifteen with an average of four days.

The working diagnoses were: obstruction, intussusception, fecal impaction, cholecystitis, toxemia, pelvic tumor and acute abdomen.

The final diagnoses were: obstruction, intussusception, fecal impaction, cholecystitis, toxemia, pelvic tumor, acute peritonitis, and diverticulum of sigmoid.

The complications in this unoperated group were: septicemia and bronchopneumonia.

The end-result was twenty-two cures and seven deaths.

The ages varied from three to eighty-five years with an average age of forty-eight, and with the greatest number in the sixth decade in both sexes. The fourth decade was next in number in the females and third and fourth decades the same in both sexes. Seven males and twenty-one females made up this group.

The decompression measures used in this series were: hot stupes, milk and molasses enema, pituitrin, rectal tube, dry heat, Nobles' enema, and lavage of stomach.

Eleven of this group had had previous abdominal operations and seventeen none. Two had been operated upon recently and nine more than two years before the obstruction. The eleven patients mentioned had been subjected to the following operations: appendectomy, cholecystectomy, resection of ileum, herniotomy, for ovarian cyst, and laparotomy.

The symptoms listed on the records of this small unoperated group were: pain, obstipation, vomiting, tenderness, distention, nausea, cramps, ventral hernia, and abdominal rigidity.

The time from onset of obstruction to its relief in the twenty-two cases that were cured varied from one to five days with an average of two days.

X-rays employed for help in diagnosis were negative four times, diagnostic of obstruction four times, and no x-ray was done in twenty-one cases.

The autopsy diagnoses in the three cases that came to postmortem were: gangrenous appendicitis, peritonitis, carcinoma of rectum, obstruction of bowels, strangulated ventral hernia, swelling of spleen, liver, and kidneys, necrosis of bowel, cloudy swelling and fatty metamorphosis of liver.

## Operated Cases of Obstruction of Bowels

(Asbury Hospital—1932-1938)

One hundred and five patients with obstruction of the bowels were operated upon in the Asbury Hospital during the period of years from 1932 and 1938 inclusive.

This period shows the beginning of the use of nasal suction and its establishment almost as a routine in the decompression of the obstructed cases in this hospital. As was shown in the statistical review of the patients with obstruction who were operated upon during the 1924-1931 period, many other accepted methods of decompression have been in use in the hospital since its opening in 1924. However, it seems logical in reviewing obstruction cases to feature decompression preoperatively and postoperatively and especially nasal suction.

The hospital records of the 1932-1938 group of operated cases show that a working diagnosis of obstruction was made sixty-six times for that intestinal trouble alone, and that it shared this tentative diagnosis with appendicitis, intussusception, fibroid tumor of uterus, strangulated hernias of different types, cholecystitis, volvulus, and fifteen other surgical conditions of various types.

A final diagnosis of obstruction of the bowels was made seventy-eight times, together with the above mentioned conditions described in the working diagnosis the same number of times. Final diagnoses in this group also listed paralytic ileus, peritonitis, Meckel's diverticulum, and various other surgical and medical conditions that accompanied and complicated the obstruction.

The operations performed in this series of cases were as follows: liberation of adhesions, appendectomy, different types of hernia repair, reduction of intussusception, salpingectomy, enterostomy, cholecystectomy, oöphorectomy, colostomy, resection of bowel and other abdominal operations to the number of seventeen.

The complications in these obstruction cases were: paralytic ileus, infected wound, bronchopneumonia, peritonitis, cystitis, streptococcic sore throat, lobar pneumonia, and other complications to the number of six.

The end-results in these cases were seventy-nine cures and twenty-six deaths, making a 25 per cent mortality. Thirteen autopsies were performed, 50 per cent.

Autopsy diagnoses included obstruction, postoperative ileus, peritonitis, broncho-pneumonia and others to the number of ten.

The ages ranged from infancy, where most of the intussusception cases were found, to past the age of eighty, where many of the strangulated hernias were encountered. An average of forty years obtained.

There is a similarity of ages in both sexes when these cases are divided into decades, with the third, fourth, and fifth decades having the greatest number, the females predominating two to one over the males. In the 105 cases there were seventy females and thirty-five males.

Of the different methods of non-surgical decompression used during the 1932-1938 period, the one most frequently used was nasal suction. This form was used fifty-seven times preoperatively and postoperatively. Other agents were: hot turpentine stupes, rectal tube, Nobles' enema, milk and molasses enema, dry heat, duodenal tube, rectal suction, pituitrin, prostigmine, and enterin. Nasal suction has replaced the old duodenal tube with syringe irrigation that was so useful in the pre-suction days.

The history of previous operations was the outstanding etiological factor in this group as in all obstructions. Fifty-nine patients had had abdominal operations. Twelve of this number developed obstruction within a few days, postoperatively; eight of the number within a few weeks or months, and thirty-nine suffered from obstruction more than two years after abdominal operation. The remaining forty-six of these patients with intestinal obstruction had had no previous abdominal operation.

The different operations previously performed upon the patients in the group were: appendectomy, salpingectomy, ovariectomy, hysterectomy, herniotomy, tumor, drainage of appendiceal abscess, cholecystectomy, and other abdominal operations to the number of ten.

The symptoms listed were: pain, vomiting, nausea, inability to obtain bowel movements, palpable or visible mass, hernia, tenderness, rigidity, distended abdomen, cramps, bloody stools, restlessness, spasm, and chills.

There has been a steady increase in the use of the x-ray as a diagnostic aid in obstruction during the seven years of this period. It was used in fifty-three of the 105 cases and proved to be diagnostic in forty-nine and negative in four.

Anesthesia used in the operations for relief of obstruction were: local, general, spinal, and combined anesthesia. Their selection depended both upon the condition of the patient and the custom of the operating surgeon.

The days in hospital ranged from one to sixty-three, with an average of seventeen days.

Investigation of the individual records showed the time from the onset of obstruction to its relief to vary from one to ten days. Many were immediately relieved at operation. This was especially true of the strangulated hernias and intussusception cases. The average length of time was two and one-half days.

Twenty-six patients died and seventy-nine were relieved of obstruction and cured.

## Unoperative Cases of Obstruction of Bowels

(Asbury Hospital, 1932-1938)

This group numbered thirty-four with twenty-six cures, eight deaths, and one autopsy; a 24 per cent mortality and 12 per cent autopsies performed.

The days spent in the hospital ranged from one to twenty-nine with an average of five days.

The working diagnoses in this group were: obstruction, intussusception, kidney stone, coronary disease, carcinoma of sigmoid, appendiceal abscess, fracture of arm, and fracture of leg.

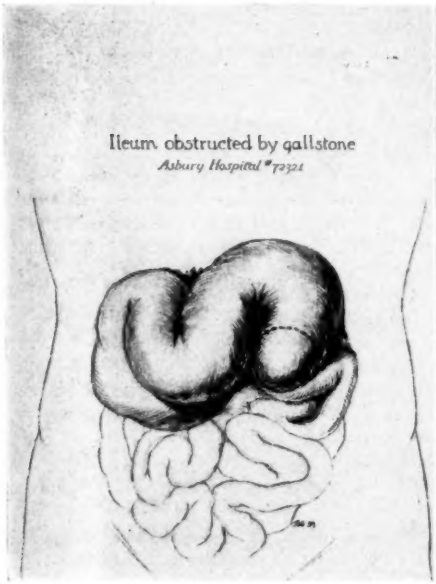


Fig. 1.

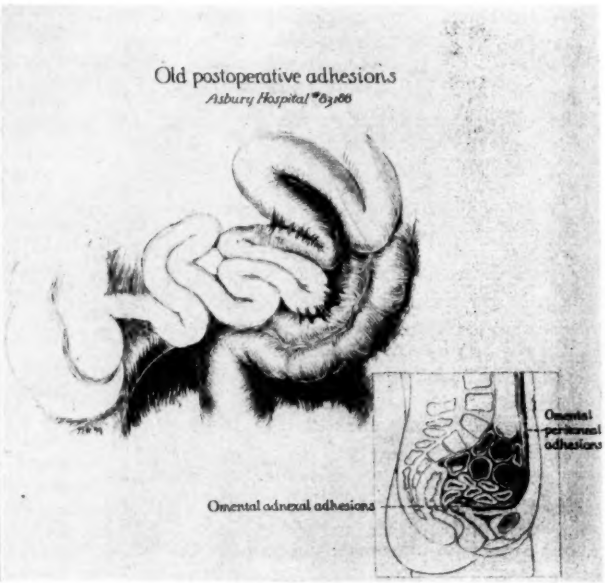


Fig. 2.

The final diagnoses were: obstruction, intussusception, cardiac arrhythmia, together with those included in the working diagnoses.

The complications found in this group during illness were: shock, peritonitis, broncho-pneumonia, coronary disease, pulmonary atelectasis, and obstruction.

The end-results in the thirty-four cases were: twenty-six cures and eight deaths.

Ages in this group ranged from one to eighty-five years with an average of twenty years. There were twenty-one females and thirteen males with this condition distributed about evenly throughout the nine decades in both sexes.

Autopsy diagnoses were: obstruction, ruptured appendix, edema of lungs, and strangulated intra-abdominal hernia.

Decompression was used as follows: nasal suction, turpentine stupes, Nobles' enema, milk and molasses enema, hot packs, dry heat, pituitrin; no decompression whatever was used in twenty-five cases. There was a steady increase in the use of nasal suction.

Previously eighteen of this group had been operated upon at some time before the obstruction: thirteen recently and thirteen more than two years before. These operations were: appendectomy, salpingectomy, adhesions, laparotomy, explorations, hysterectomy, exploratory for bullet, ovariectomy, and cholecystectomy.

The symptoms listed on the records were: pain, tenderness, obstipation, vomiting, distension, rigidity, nausea, and mass in abdomen.

X-ray was used twenty-seven times, being negative nine times and diagnostic eighteen times.

Onset to relief ranged from one to three days. More than half were relieved of obstruction in one day, the average being one and three-tenths days.

*Case 1.*—Series 1924-1931. A white woman, aged sixty-five, was admitted to the hospital with a working diagnosis of intestinal obstruction, having been ill for about forty-eight hours. The clinical findings were those of complete obstruction in spite of a negative x-ray. Operative findings (Fig. 1) were that of a gallstone in the lumen of the ileum in the left lower abdominal quadrant. This was removed and the intestine closed. This patient had had no previous surgery and recovery was uneventful.

*Case 2.*—Series 1924-1931. A white woman, aged thirty-seven, was admitted to the hospital with a working diagnosis of intestinal obstruction and clinical findings the same. X-ray findings were positive for this condition. The liberation of adhesions was done under general anesthesia and the operative findings were: a band running from the ileum to a point two feet from ileocecal valve to sigmoid colon and a short band between two loops of ileum; thirty inches of ileum was collapsed (Fig. 2). This patient had had previous operation two years ago consisting of a salpingectomy, oöphorectomy and cholecystectomy. No complications arose and after thirteen days of hospitalization patient was discharged as cured.

*Case 3.*—Series 1924-1931. A white man, aged twenty-two, was admitted to the hospital one week previous and operated upon for acute appendicitis with rupture and peritonitis. Course subsequent to appen-

dectomy very unsatisfactory. Diagnosis of obstruction with peritonitis and postoperative ileus was made on second day of operation. The operative findings were: peritoneum inflamed, cavity containing purulent fluid; intestines distended and inflamed but no evidence of this case were parotitis and contraction of flexors of wrists. He was discharged as cured after twenty-nine days of hospitalization.

*Case 5.*—Series 1932-1938. A white woman, aged 52, was admitted to the hospital with a working diag-

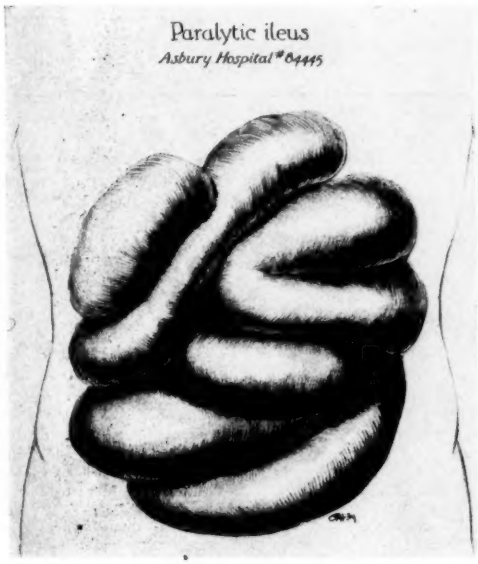


Fig. 3.

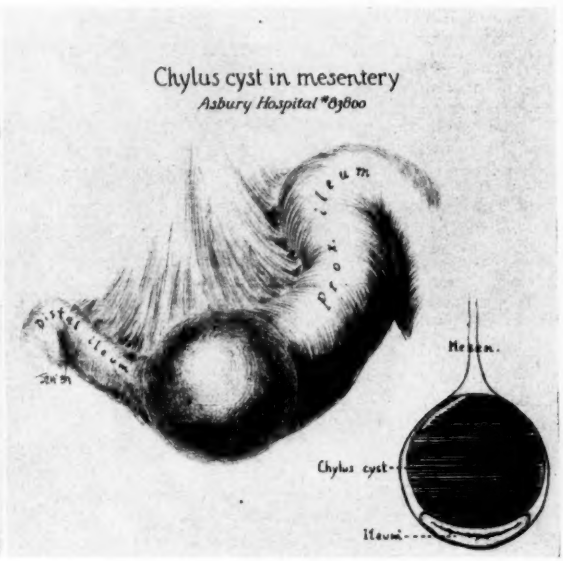


Fig. 4.

Fig. 5.

Fig. 6.

mechanical obstruction (Fig. 3). An ileostomy was performed. The patient died at the end of nine days.

*Case 4.*—Series 1924-1931. A white boy, aged eight, was admitted to the hospital with a working diagnosis of intestinal obstruction. The clinical findings were those of a complete obstruction and the x-ray findings were positive for this condition. The operative findings were: under operative scar a mass the size of grapefruit was found attached to small intestine and mesentery. The bowel above the mass was distended and it was collapsed below (Fig. 4). The mass and eight inches of bowel were removed. An end-to-end anastomosis was performed. This patient had had an appendectomy one year previous. Complications in nosis of strangulated hernia. The clinical findings were those of a complete obstruction and no roentgenograms were made. The patient was removed to the operating room and under spinal anesthesia liberation of adhesions and repair of hernia were done. The operative findings were a strangulated ventral hernia the size of a large grapefruit, containing loop of ileum, portion of omentum and mesentery (Fig. 5). Previous operation was for an ovarian tumor ten years ago. No complications arose and after twenty-one days of hospitalization this patient was discharged as cured.

*Case 6.*—Series 1932-1938. A white woman, aged thirty-nine, was admitted to the hospital with a working diagnosis of gastro-intestinal ptosis and obstruc-

tion. The clinical findings were those of a complete obstruction and the x-ray findings were diagnostic. The patient was removed to the operating room and under spinal anesthesia the liberation of adhesions and reduction of volvulus were performed. The operative findings were: dilated loop of small intestine with bloody serous fluid; large and small colon in pelvis; a point of ileum two feet from ileo-cecal valve was attached to ovary of right side and there was a full turn volvulus present (Fig. 6.) A salpingectomy had been performed two years ago. Nasal suction was used preoperatively and postoperatively. The patient had no complications and after sixteen days of hospitalization was discharged as cured.

*Case 7.*—Series 1924-1931. A white woman, aged thirty, was admitted to the hospital with a working diagnosis of obstruction of small intestine. The clinical findings were those of reversed peristalsis and fecal vomiting. No roentgenograms were made. The operative findings were as follows: entire small bowel greatly distended with gas; mesenteric volvulus, a complete turn; ileum adherent to horns of uterus; omentum adherent to ileum and anterior peritoneal surfaces. An ileostomy and liberation of adhesions were performed under general anesthesia. This patient had had a salpingectomy two years previously. A complication of fistula arose. However, after eighteen days in the hospital she was discharged as cured.

*Case 8.*—Series 1924-1931. A white man, aged twenty-one, was admitted to the hospital with a working diagnosis of obstruction of the bowel, and clinical findings were those of a complete obstruction. No roentgenograms were made. The operative findings were as follows: a loop of the terminal ileum adherent to upper angle of appendectomy scar and twisted upon itself one full turn; another portion of the ileum was adherent the entire length of the appendectomy scar, causing a volvulus of the mesentery of the small bowel. Liberations of adhesions, reduction of volvulus, and an enterostomy were performed under general anesthesia. This patient had had an appendectomy three months previously. Complications were ileus and peritonitis and the patient died after one day in the hospital.

*Case 9.*—Series 1924-1931. A white girl, aged fourteen, was admitted to the hospital with a working diagnosis of intestinal obstruction with clinical findings the same. No roentgenograms were made. Operative findings were: ileum eighteen inches from ileocecal valve attached to head of cecum, loop collapsed; loop twelve inches from valve attached to ascending colon and anterior peritoneal surface; omentum adherent to this attachment. The operation was the liberation of adhesions, untwisting the most distant volvulus and separation of adhesions, all of which showed ileum torn apart twelve inches from ileo-cecal valve. An end-to-end anastomosis was done. Decompression used was duodenal tube and syringe. This patient had had an appendectomy six months previously. No complications arose and after twenty days of hospitalization was discharged cured.

*Case 10.*—Series 1932-1938. A white man, aged seventy-seven, was admitted to the hospital with a working diagnosis of strangulated hernia. The clinical findings were those of a complete obstruction. No roentgenograms were made. The patient was removed to the operating room and under spinal anesthesia liberation of adhesions, reduction of volvulus and repair of hernia were done. The operative findings were: hernial sac filled with black fluid; bowel dark and injected; a loop of small bowel in sac in complete volvulus. A final diagnosis of strangulated hernia and obstruction of small intestine with volvulus was made. This patient had had a prostatectomy four years previously. No complications arose and after thirty-one days in the hospital was discharged as cured.

*Case 11.*—Series 1932-1938. A white woman, aged thirty-six, was admitted to the hospital with a working diagnosis of bowel obstruction with clinical findings those of complete obstruction. X-ray findings were diagnostic. Under spinal anesthesia a lateral anastomosis and a diverticulectomy were done with the operative findings showing the small bowel distended and diverticuli encircling bowel at proximal end of ileum. Nasal suction was employed on this patient. She had had previous operation for the liberation of adhesions several years ago. No complications arose and this patient was discharged as cured after thirty-nine days of hospitalization.

*Case 12.*—Series 1932-1938. A white woman, aged 27, was admitted to the hospital with a working diagnosis of spastic stomach with clinical findings those of complete obstruction. X-ray findings showed obstruction at terminal ileum. Liberation of adhesions was done under general anesthesia and the operative findings were those of terminal ileum attached to fundus of uterus one foot from ileo-cecal valve and a volvulus one complete turn held in place by newly formed adhesions. A final diagnosis of mechanical obstruction of bowels with volvulus was made. Nasal suction was used preoperatively and postoperatively. Salpingectomy had been performed eight years ago. No complications arose and the patient was discharged as cured after thirteen days.

*Case 13.*—Series 1932-1938. A male infant, one year of age, was admitted to the hospital with a working diagnosis of intussusception with clinical findings showing obstruction due to intussusception. Reduction of intussusception was done under general anesthesia and the operative findings were those of intussusception of ileum through ileocecal valve into the large intestine, running as far as the sigmoid flexure. This patient had had no previous operation and after thirteen days in the hospital he was discharged as cured.

*Case 14.*—Series 1932-1938. A white woman, aged sixty-six, was admitted to the hospital with a working diagnosis of strangulated ventral hernia with clinical findings showing a completely obstructed condition. No roentgenograms were made. Liberation of adhesions, reduction of volvuli and repair of hernia were done under spinal anesthesia. The operative findings were as follows: a loop of ileum, portion of mesentery and omentum were found adherent in mass the size of a large grapefruit; a complete volvulus of the ileum and one-half turn volvulus of the mesentery. This patient had had an appendectomy performed and two operations for strangulated hernia previously. Nasal suction was used post-operatively. No complications arose and the patient was discharged after twenty-one days as cured.

*Case 15.*—Series 1932-1938. A white woman, aged thirty-five, was admitted to the hospital with a working diagnosis of acute appendicitis and with clinical findings those of a complete obstruction. X-ray findings, however, were negative. Under combined anesthesia the liberation of adhesions and an appendectomy were performed with the operative findings as follows: loops of ileum greatly distended at cecum; large adhesive band across terminal ileum. Nasal suction was used in this case and the patient made an uneventful recovery, being discharged after nine hospital days.

### Summary of Statistical Study

A 10 per cent decrease in mortality appears in the nasal-suction period of this statistical study as compared with the prenasal-suction period.

This improvement is, no doubt, due to such factors as better and more frequently used roentgen ray studies for diagnosis; a more surgically-minded public than in former years, resulting in the surgeon being called earlier in the illness.

Most important of all, however, is nasal suction for decompression of the distension of acute obstruction which enables us to make our patient comfortable and operable and also to keep him free from distention postoperatively.

All of the important items contained in the surgical records were listed in the order that they appeared upon the records for the purpose of showing the work done with this type of obstruction over a period of fifteen years.

The period from 1924 to 1931, inclusive, was the prenasal-suction period. The period from 1932 to 1938, inclusive, was the nasal-suction period. Decompression is featured in a very broad sense, including every agent that was applied for the purpose of relieving distention, even including the operation that usually terminated the obstruction.

A few of the very interesting and typical cases are presented in some detail with the artist's interpretation of the surgeon's dictated findings at operation.

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## THE MALE HORMONES*


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THE male of the human species has apparently always been interested in his gonads. The easy accessibility of these organs and their anatomical relationships appears to have intrigued the curiosity of those with surgical minds, even long before Biblical days. The peculiar characteristics associated with castration in the male apparently establish the first clinical picture of endocrine dysfunction. Symptoms and signs developing after castration led to the association of similar findings in uncastrated individuals as being related to the gonads.

The testicles have always been regarded as the seat of virility and strength in the male, although modern researches have shown that this is not always the case. However, loss of the testicles produces such a profound impression upon the psyche of the individual that the modern psychoanalyst has evolved what he calls the castration complex in an attempt to explain many of the psychoneurotic manifestations that he frequently encounters.

I need not at this time recall in detail the numerous attempts to substitute or replace the function of the absent or poorly working gland. Scientists, and others not scientists, for several hundred years have attempted by various means to achieve this end. Gland grafting, goat gland implantation, ligation of the ductus deferens and the production of testicular extracts are only a few of the methods that have been tried. It is only recently that we have had available a potent male sex hormone.

The development of the sex hormones as well as several of the other hormones has been a triumph of biochemistry. The isolation identification and production of these hormones is a story as fascinating as any romance.

In 1927, McGee studied the effects of a lipoid fraction of the bull's testis on the growth of a capon's comb. This was quickly followed by advances in the study of the androgens. The first androgen that was isolated from the urine was identified as dehydroandrosterone.

At first it was thought that these substances found in the urine were those that occurred in the testis. However, it was soon found that the active substance found in the testis was destroyed by alkali, whereas that in the urine was not. Therefore, the testicular hormone must be different. In 1935, Laquer isolated testosterone from the testis of the bull and this was found to


*From the Miller Hospital, Saint Paul, Minnesota. The laboratory work in the cases reported was done in the Laboratory for Urinary Sex Hormone Studies, WPA project 665-71-3-3. The testosterone propionate used in these cases was Perandren, in part supplied by the kindness of Ciba Co. Read before the annual meeting of the Minnesota State Medical Association, Minneapolis, Minnesota, June 1, 1939.

be five to eight times as effective as androsterone in stimulating the growth of the capon's comb. One hundred pounds of bulls' testis produced only 4 to 10 mg. of testosterone. The testis, then, is a factory and not a storehouse of this hormone.

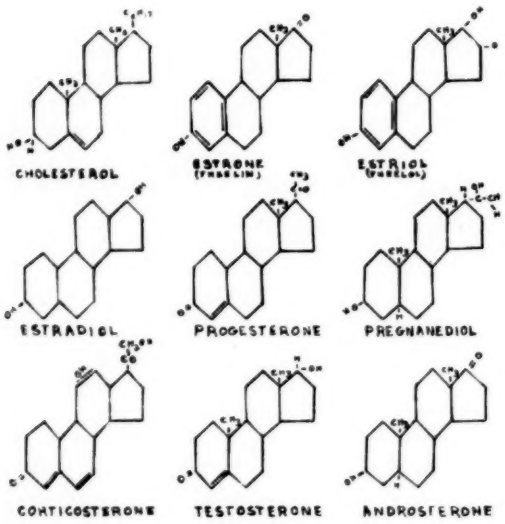


Chart 1.

The male hormones are chemically closely related to the female sex hormones. The mother substance of all the hormones is most likely cholesterol, and this substance forms the base for the synthetic production of the male hormones. There have been numerous substances with male hormone properties produced synthetically and a few of them with both male and female characteristics.

It is of some practical importance that the physician be acquainted with the chemistry and occurrence of the various sex hormones. Of the male hormones only two have been identified in the urine: anderosterone and dehydroandrosterone. Of these two, one, androsterone, is of importance only because the international unit of the male hormone is defined as being 0.1 mg. of androsterone. The international unit of male and female hormones has been established by the League of Nations division of public health. The only male hormone of therapeutic importance is testosterone. It has been found that the propionic ester form is twelve to seventeen times as effective as testosterone itself. The now commercially available preparation is testosterone propionate. Another hormone with male properties has been isolated from the adrenal gland cortex and designated as adrenocorticosterone. From 2,200 pounds of bulls' adrenals 26 mg. of this hormone has been isolated. The male hormone present in the urine of castrates in small amounts probably comes from this source.

The average daily excretion of the male is around 50 to 60 bird units of androgenic substance (Male Hormone) a day and about 90 to 120 international units of estrogenic substances (Female Hormone). The female excretes, on an average, about 40 to 50 bird unit androgenic substances and 180-360 international unit of estrogenic substances. There are rather wide variations from these figures in a few normal cases, but the findings are helpful in the diagnosis of hypogonadal conditions and hypergonadal states, especially those associated with hyperfunctioning adrenal cortical tumors. It is interesting to note that female castrate excretes a small amount of male hormone which, as I stated before, most likely comes from the adrenal cortex.

The urine of males and females contains both sex hormones in fairly equal amounts, and for this reason I would like to discuss very briefly the female sex hormones. It has been felt by some investigators that the ratio between the male and the female urinary sex hormones is of equal if not more importance than the total amount of the male hormonal substance present. The ovary of the female contains two hormones, the estrogonic hormone in the form of estradiol, and the luteal known as progesterone. The urine of the non-pregnant female contains two forms of estrogenic substance—esterone (Theelin), and estriol (Theelol). The urine also contains a derivative of progesterone known as pregnanediol.

Just what are the effects of the male hormone? When we speak now of the male hormone we are referring to the substance commercially available and designated chemically as testosterone propionate. In adequate doses this substance will stimulate libido in the eunuchoid individual causing an increase in the frequency of erections. It will cause a temporary enlargement of the prostate gland and increase in the consistency of the penis, and if the doses are

large enough, painful priapism may be produced. At times the increased blood supply to the penis and scrotum is evidenced by a definite redness of the scrotal skin and redness of the glans penis. In some cases it will cause a return of facial and pubic hair growth where it has been lost, and a deepening of the voice.

Kenyon, who has carried out metabolic studies in four cases of eunuchoidism, found a decrease in the excretion of urinary nitrogen and decrease in sodium excretion and a gain in weight following the injection of testosterone propionate. In some cases definite edema developed, probably due to the sodium retention.

All the above effects will disappear at varying periods following the injections. The effect of the injections may last for some time, in my experience the longest period being approximately two months and the shortest period two weeks.

The following cases illustrate fairly well the effect of the hormone:

*Case 1.*—This individual was forty-two years old. Following a hernia operation, about four years before, one testicle began to diminish in size, probably due to interference with the blood supply. Two years later the patient noticed the other testicle was diminishing in size and that libido was not what it was formerly. He became weaker and was unable to work. He was sent to the hospital for study as the attending physician felt that he was suffering from Addison's disease. In the hospital it was noted that the testis and the penis were definitely small, the prostate was soft and flat. No spermatozoa were found on expressing the prostate and seminal vesicles. No change was noted in the hair distribution and he had to shave about as frequently as before. The blood pressure was low but no pigmentation in skin or mucous membrane was noticed. Salt deprivation tests did not cause any trouble and blood sodium chloride was normal. Urinary assay study showed a marked decrease in the excretion of androgens and estrogens. Androgens assayed 19 units in twenty-four hours; the estrogens, 24 international units in twenty-four hours. He had previously been given a series of cortin (adrenalcortical hormone) injections with no improvement.

Injections of testosterone propionate was started in 25 mg. doses three times a week. At the end of one week he reported was feeling much stronger and felt that he could try some light work. Libido was markedly increased and fairly satisfactory intercourse occurred. The penis was firmer and the glans redder. No change was noticed in the size of the testicles or prostate gland.

He was given nine injections over a period of three weeks of 25 mg. each. The hormone was stopped and the injections were continued with sterile water unbeknown to the patient. He continued for a little more than five weeks to feel strong and happy. He then began to tire easily and felt depressed. Libido had almost disappeared. He was started again on 10 mg. doses three times a week with only slight improvement. The doses were increased to 25 mg. with a return of the feeling of well-being that he had enjoyed before. One can feel sure that the psychological element was well ruled out.

*Case 2.*—A man aged twenty-four years, following mumps eight years before, developed an orchitis with a marked atrophy of both testes. The voice was high pitched. He shaved only about once a week, and the facial hair was soft and sparse. There was a moderate increase of fat over the pubis and lower abdomen and hips. He was married and had no children, and only rarely attempted coitus. Both testicles were pea size, penis and prostate small. No spermatozoa were present on prostatic and seminal vesicle massage. The urine androgen excretion was only 9 bird units a day and the estrogen was 15 international units.

Following four injections of 25 mg. of testosterone propionate he felt more vigorous and libido improved very markedly. Following fifteen injections of the same dose, the beard became coarser and denser, the pitch of the voice became definitely lower and he stated he was having satisfactory intercourse two to three times a week. Following the cessation of treatment all signs of improvement disappeared.

What are the indications for the use of this male hormone? These are not as yet entirely clear except in those instances where definite evidence of eunuchism or eunuchoidism is present. Here one can expect very definite and favorable temporary results.

It is particularly of value in the early age group who have, because of injury or disease, suffered a lack of testicular function with a resulting failure of development of the secondary sex characters. The lack of development in the secondary sex characters creates in the individual a marked sense of inferiority and may lead to serious psychopathic states. The diagnosis in this type is easy to make principally because of the absence of mature male secondary sex changes.

In the late castrate and eunuchoid individual in which the testicular injury was sustained after puberty had occurred, and in whom the secondary sex characters had already developed, the diagnosis is still not difficult as there is usually evidence of testicular atrophy. One must remember that in these cases often there is no change in the already existing sex characters. The beard may continue to grow, the voice will

retain its normal pitch and even libido may be retained for some time. In such cases one cannot expect any somatic changes from the administration of the hormone. What reason, then, is there, if any, for the use of the hormone in such a case. Obviously none at all unless there is present marked weakness or definite psychoneurotic manifestations.

This type of case is very similar in its manifestations to that described as the male climacteric, that is, a change in the male, producing symptoms similar to that which occurs in the female in menopause: hot flashes, emotional disturbances, tachycardia, et cetera. As in the female it is supposedly due to a loss of function in the testicle due to a degenerative process. The resulting loss of testicular hormone which is pituitary inhibiting, permits an overproduction of the gonadotropic pituitary hormone which, supposedly, is responsible for the symptoms.

It is not easy to ascertain, clinically, whether a male climacteric is present. We have no guide like the loss of menstruation in the female to tell us that the gonads are no longer functioning. The characteristic symptom in females of hot flashes is only rarely present in the male. Loss of libido is not a reliable indication. The symptoms are primarly those that are associated with what we are accustomed to term as functional inadequacy or psychoneurosis. As yet the male climacteric as a definite clinical condition is not well established. Urinary sex hormone assays may help to identify this state more clearly.

As I have mentioned before, the urine in both sexes contains both male and female hormone-like substances and it is believed that a disturbance in this ratio is rather characteristic of certain conditions. Lacquer suggested because he found a relative increase of female urinary sex hormone in men with prostatic enlargement that by injecting male hormone there would tend to be established a more normal ratio which would help relieve the symptoms of prostatic hypertrophy. He reported fairly good results; other reports have been very conflicting. In general it is felt that in some cases the use of the male hormone will carry a patient over an acute period by increasing the tone of the bladder muscle, but that it will not produce a reduction in the size of the prostate or any change in the progress of the disease.

The question often arises whether this hormone should be given in those cases where there is a loss of libido not associated with testicular insufficiency? We know very little about libido and potency in the male except that frequently its loss and dimunition is purely a psychic manifestation. I have had no personal experience in using this hormone in this condition. The few reports available indicate that in the presence of a normal functioning gland, the hormone is not effective.

Cryptorchidism is often associated with hypodevelopment of the male sex organs, and in these cases the administration of testosterone propionate is very effective in causing a descent of the testis. It has been used in boys before the age of puberty, but for this purpose a more logical form of treatment would be the use of the anterior pituitary-like hormone to stimulate the activity of the testis and in that way cause a descent of the gland. However, in the individual past the age of puberty, with a failure of the development of the secondary sex characters and who also has undescended testis the male sex hormone should be given a trial.

### Therapy

Before starting treatment, the physician must decide if there is any possibility of stimulating the function of the testis. To determine this is not easy. The size and firmness of testicles, the color and consistency of the penis and changes in the secondary sex characters are of great help. Complete absence of testicular function is definitely demonstrated by assay of the androgenic hormone in the urine. This method will also show marked hypofunction of the testis.

If the testis is capable of stimulation, the sex hormone should not be used; instead we should try the gonadotropic pituitary hormone or the urinary pituitary-like hormone. This hormone is capable in adequate doses of stimulating the testis to function. Response to this form of therapy is not prompt and the physician should be prepared to give at least two courses of injections lasting six to seven weeks each. The minimum amount to be injected should not be less than 500 rat units of anterior pituitary-like substance three times a week or 2 c.c. of the gonadotropic hormone of the pituitary gland given in the same manner.

At present the only satisfactory male sex hormone is testosterone propionate, a synthetic product marketed under several trade names. It is only recently that this hormone can be purchased at a price permitting adequate dosage. Early failures were due, I am sure, to the use of too small an amount. In an adult, doses under 10 mg. three times a week appear to be inadequate. I feel that in the beginning of treatment a dose of 25 mg. three times a week should be administered. After the desired effects are secured the dose can be cut in half.

Recently I received literature from a manufacturer who distributes ampules of bulls' testis hormone, each ampule containing, according to the statement, 2 capon units. Two capon units would be about equivalent to less than 0.01 mg. of testosterone propionate in effectiveness. About all that one can say about a dose of this size is that if it is injected into the capon every day for about six to eight weeks it will cause the comb to grow to the size of a normal rooster's comb. There is no oral preparation that is of any value. It seems fairly definitely established that percutaneous administration in the form of an ointment is about as effective as intramuscular injection if large amounts of hormone are used. This method of administration is still too new to warrant a definite statement as to the dosage, and adequate amounts would make his form of therapy very costly.

Are there any harmful effects from the use of the hormone? It has been tried in women for the relief of various ailments and several reports have shown that it has produced unusual hair growth that appeared to be permanent. It can also produce anginal pains in those individuals suffering from coronary sclerosis, probably from emotional disturbances. It is generally felt, in endocrine substitutional therapy that the administration of a hormone over long periods to an individual who has functioning glands that produce such a hormone would result in putting the gland to rest. Whether testosterone given to a patient with functioning testicles will injure the gland is not known at present. Experimentally it has been shown that small doses of 5 mg. and less will not, but whether 25 mg. given over long periods will cause an injury we do not know. Certainly the physician should select his patients carefully.

In conclusion, then, we can say that we now have available for substitutive therapy an effective male sex hormone capable of replacing in almost every respect the loss of function of the testicle. These effects are in no way permanent, because, following the cessation of treatment, there is a return, in a comparatively short time, of all the symptoms and signs that were present before the hormone was administered. Today there is only one clear indication for the use of this hormone and that is in those conditions where objectively, or by urinary hormone assay, there is a definite indication of the loss of testicular function. Its use has been advised in other conditions but as yet the evidence does not warrant such therapy.

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## HYPOGLYCEMIC CEREBRAL DAMAGE IN DIABETIC PATIENTS*

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WITHIN recent years a great deal of interest has been manifested on the subject of hypoglycemia and its effect upon the nervous system. The impetus for this interest has been due primarily to the widespread use of hypoglycemic shock as a therapeutic agent in the functional brain disturbances. As a result of recent investigations both on human and animal brain tissue (Terplan,[18] Malamud and Grosh,[15] de Morsier and Mozer,[9] Kobler,[13] Schmid,[17] Accornero,[1] Baker,[2,3] Baker and Lufkin[4]), it appears fairly well established that hypoglycemia, regardless of the cause and often unrelated to its severity, pro-

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duces in many individuals fairly severe and often permanent brain tissue damage. This damage consists of cerebral petechiæ, areas of demyelinization and cavity formation, and diffuse and focal glial proliferation. Nerve cell injury does occur but is not always the most conspicuous finding. The implications of these observations to the field of medicine, especially in cases of insulin overdosage in diabetics, have been, for the most part, neglected. Ever since the introduction of insulin in the treatment of diabetes, the internist has been confronted with the occasional occurrence of mild and severe insulin reactions. These have been considered rather lightly since most reactions respond fairly promptly to proper treatment with glucose administered orally or intravenously. However, in view of the present knowledge concerning the effects of hypoglycemia upon the brain, one is forced to admit that insulin reactions may not be entirely innocuous. A review of the literature and a study of our own cases has emphasized the fact that in some individuals overdosage of insulin may produce definite damage to the cerebral tissues.

The dangers of insulin reactions were realized as early as 1921 when Joslin[11] cited two fatalities in diabetics. Since that time Joslin[12] has published the records of five deaths from insulin overdosage; none of these patients were, however, under Joslin's care. In three, a diagnosis of diabetic coma was made and insulin given to a patient already in hypoglycemia, while in a fourth case, death resulted in spite of glucose therapy. Many other fatalities have been reported in the literature (Campbell and Macleod,[7] Pemberton,[13] Heimann-Trosien and Hirsch-Kauffmann,[10] Dahl,[8] Wohlwill,[19] Terplan,[18] Bodechtel,[5] Bowen and Beck,[6] and Lindsay,[14] et al). Campbell and Macleod reported two cases; one patient was an alcoholic who failed to respond after taking an overdose of insulin, while the other succumbed after increasing the insulin dosage because of a gastro-intestinal disturbance. Pemberton's patient suffered from both tuberculosis and diabetes. On the regular regime the patient suddenly went into hypoglycemia and failed to recover. Both of Wohlwill's patients received overdosage of insulin. The first patient on his regular dosage developed hypoglycemia and was given an additional 135 units of insulin. She failed to respond in spite of subsequent glucose therapy. The second patient expired after being given an extra 100 units of insulin because of a breast abscess. Terplan's patient also received an overdose of insulin and developed a hypoglycemia which manifested itself in generalized convulsions. In spite of therapy he failed to respond and died in three days. Both of Bowen and Beck's cases were diabetics who were given insulin while already in hypoglycemia. Lindsay's case was a fifty year old diabetic who died after eight days of coma. He also failed to respond in spite of prompt institution of the proper therapy.

Although the list of reported hypoglycemic fatalities in diabetics is not very large, it seems fairly safe to assume that this small number of cases is due probably to the failure to study and record such accidents. Even more important, however, than these fatal cases are those that show slow recovery or recovery with permanent functional impairment. These cases tend to demonstrate the borderline in the reversibility of the cerebral changes. From the recent studies in hypoglycemia, there can be no doubt that single severe or repeated hypoglycemic shocks may produce a depression of cerebral function and often some irreversible changes of the brain tissues. The degree of these changes determines whether the patient experiences a slow recovery, recovery with permanent functional involvement, or failure of recovery and death. It is with the purpose of reporting such cases and of emphasizing the dangers of hypoglycemia in diabetics that this report is made.

## Case Reports

*Case 1.*—J. N. (No. 683244), a forty-nine-year-old laborer had had diabetes mellitus for fourteen years. For the past several years he had taken fifteen units of regular insulin twice daily. During this period, he had experienced numerous hypoglycemic reactions. He was, in addition, a chronic alcoholic, and some of his hypoglycemic reactions were possibly mistaken for acute alcoholism. On the afternoon of the day of admission, he was found in an unconscious state by his relatives. His condition was mistakenly attributed to acidosis, an additional 25 units of regular insulin were given, and he was admitted to the University Hospital five hours later. His blood sugar at this time was less than 14 mgm. per cent. Glucose, in large amounts, was administered intravenously and his blood sugar thereafter maintained above 170 mgm. per cent. 3,000 c.c. of para-oral fluids were given daily.

His temperature was 97° F. (rectal) on admission, but in a few hours rose to 105° F., and remained thereafter between 103° F. and 105° F. The patient lived for sixty-two hours after admission to the hospital; he did not regain consciousness before he died.

The autopsy studies were essentially negative except for the brain. Microscopic study of the brain tissue revealed scattered areas of early myelin alteration. In some regions a beginning fragmentation of the myelin tissue was apparent. A few scattered patechiæ could be found. Only an occasional glial nodule was observed.

*Case 2.*—A. N. (No. 674133), a fifty-three-year-old laborer, had had diabetes mellitus for four years. He was first admitted to the University Hospital for an amputation of the right great toe because of arteriosclerotic gangrene. One hundred and thirty units of regular insulin daily were required at this time for the control of his diabetes. The wound healed poorly, and a low thigh amputation was advised, but was refused by the patient, who then returned to his home. Due partly to the persistence of infection in the arteriosclerotic extremity, his diabetes was poorly controlled at home, and he experienced several severe hypoglycemic reactions. Three weeks after his discharge, he was readmitted to the hospital in a severe hypoglycemic state. The blood sugar level was less than 15 mgm. per cent, and his temperature was 101° F. (rectal). Intravenous glucose was administered in large amounts, and two hours after admission his blood sugar was 189 mgm. per cent. The patient did not regain consciousness; he became progressively worse, and expired five hours after entrance to the hospital.

Autopsy studies revealed no somatic changes except in the brain. There was a large area of encephalomalacia situated in the right frontoparietal region, as well as smaller cavitations in the occipital poles. Microscopic studies showed a diffuse and patchy demyelinization. Glial proliferation both of a diffuse and nodular nature was also present. Small petechiæ could be found in most sections.

*Case 3.*—A. C. (No. 38-822), a thirty-nine-year-old man, had been a known diabetic patient for twenty years. He had had several severe insulin reactions, during one of which he had had several convulsions. A year prior to his death he attempted to change to protamine insulin, but suffered a severe reaction. He was subsequently controlled with regular insulin. On the evening of his death he collapsed in the bathroom shortly after receiving his evening insulin. He was found by his mother in this state, and was given considerable amounts of orange juice, which he swallowed. A physician was called, but the patient was dead at the time of his arrival.

Significant autopsy changes were found only in the brain. Grossly, petechiæ were visible in the subependymal regions of the lateral ventricles. The histological changes were relatively mild, and consisted primarily of a diffuse type of glial proliferation. There was also observed a tremendous distention of the perivascular spaces with a mild vacuolization of the white substance to form small cavities. The nerve cells were generally shrunken.

*Case 4.*—R. S. (No. 648507), a sixty-two-year-old farmer, was admitted to the University Hospital with symptoms referable to a chronic cholecystitis, cholelithiasis and severe diabetes. He required an average of 184 units of insulin daily during the sixteen months he was under observation. During this time he experienced several severe insulin reactions. Prior to his last admission, while at his home, he developed an upper respiratory infection, followed by acidosis. A total of more than 500 units of insulin (regular) were given during the next eighteen hours. By this time sugar was no longer present in his urine, but he was still comatose and was perspiring freely. Insulin was discontinued and, following the administration of sweetened fruit juices, he gradually recovered consciousness. Although no determinations of his blood sugar were made during this period, it appears not unlikely that he passed from diabetic acidosis to a hypoglycemic state before recovering consciousness. When he was brought to the University Hospital a day later, his condition appeared good. On the following day, however, a mild spasticity appeared on the right side. He became disoriented and irrational, and had several convulsive seizures involving the right side of his body. His blood sugar was maintained at a normal level during this period, and acidosis did not develop. His condition gradually became weaker, he failed to respond, and died without regaining consciousness.

At postmortem there was found a chronic pancreatitis, fatty changes in the liver, and some edema of the lungs. Gross examination of the brain revealed a multilocular cavity in the left inferior parietal lobule and scattered petechiæ throughout the white substance of both hemispheres. Microscopic studies revealed areas of encephalomalacia with cyst formations, marked gliosis, and numerous scattered petechiæ. The glial proliferation in some areas was so extensive that it had replaced large areas of brain tissue.

*Case 5.*—J. M., an eight-year-old white boy, developed symptoms of diabetes one year prior to his first hospital admission. He was well regulated with diet and 5 units of insulin (regular) three times daily. He was then followed in the Out-Patient Department of the Minneapolis General Hospital, where nothing abnormal was noted insofar as concerned his mental condition.

One year later, he was admitted to the hospital in a critical condition, unconscious, and having violent tetanic convulsions, Two days prior to this the child had had a mild cold, and his insulin (regular) increased to 65 units daily. On the day of admission he felt well, went to school and played as usual. Ten minutes after receiving 20 units of insulin (regular) at

6:00 p. m., he developed convulsions. Orange juice and sugar by mouth were without effect; he vomited violently and was immediately brought to the hospital.

On admission the child was in coma, and was having violent tetanic spasms. The eyes moved from side to side. Respirations were of the Cheyne-Stokes type. Spasm of the laryngeal muscles was present with extreme cyanosis. He was given large amounts of glucose intravenously, as well as calcium chloride, chloral hydrate and sodium amytal, all of which proved of no avail in stopping the convulsions. It was not until several hours later that his convulsions were finally controlled with deep ether anesthesia.

Blood taken at the time of his admission revealed the sugar to be below 30 mgm. per cent, the carbon dioxide combining power 50 volumes per cent, blood calcium 6.8 mgm. per cent.

Large amounts of glucose were given intravenously, and the patient slowly regained consciousness. It was not until a week had elapsed, however, that the patient began to respond to questioning, and even then he was unable to speak coherently. The child was followed in the hospital for a period of six months, during which time his diabetes was well controlled, but his mental condition did not return to normal. The patient was unable to cope with even simple situations, such as dressing himself. Perseveration—the repetition of words—was frequently noted. He would often fail to recognize individuals whom he had known since childhood. His neuropsychiatric evaluation was that of marked mental retardation. Repeated examinations of his spinal fluid were normal, as was roentgen examination of the skull. Institutional care was recommended but refused by the parents. He was discharged from the hospital on a regime of 35 units of insulin (regular) daily. Only slight improvement had occurred in his mental condition at the time of his last examination.

*Case 6.*—H. E. (No. 643612), a fifteen-year-old white school girl, had been diabetic for about eleven years, requiring 15 units of insulin (regular) three times daily. Because of frequent mild insulin reactions, she was admitted to the Pediatric Service of the University Hospital for regulation. Her insulin was changed to 45 units of protamine given once daily at 8:00 p. m. Shortly after admission she had a mild insulin reaction, but responded at once to the oral administration of sweetened orange juice. Two days later she was difficult to awaken, complained of nausea and was unable to void. She was fed her breakfast, but later vomited all the food taken. Following this, she became semicomatose, and developed peculiar jerking movements of the right side of her face and body. She was given glucose intravenously, but did not respond well. The blood sugar that evening was 38.5 mgm. per cent. Glucose was administered steadily, but the patient remained in a semi-comatose state throughout the following day. Her temperature rose to 105.5° F., and her pulse to 176 per minute. Spinal fluid was found to be under pressure of 18 mm. of mercury. On neurological examination the fundi were normal, the deep reflexes were slightly increased on the right, and the Babinski sign was positive on the right. The patient gradually improved, although an aphasia and right-sided paresis persisted. A week later her temperature and pulse were normal; she would respond when spoken to, but she was still disoriented, and failed to recognize familiar objects. Her diabetes remained difficult to control, requiring from 40 to 45 units of insulin (regular) daily. At the time of her discharge from the hospital there still remained a definite aphasia and a right-sided paresis. Following her discharge, the child had occasional peculiar attacks characterized by falling to the floor, tonic spasms, followed by clonic contractions of all the extremities. These appeared without warning and would last for several minutes. She has also had peculiar crying spells, and has complained of mild headaches with visual disturbances.

At the time of her last examination, she had shown a definite improvement in her speech, and was able to carry on the simplest types of conversation. There was a slight weakness and ataxia in the right upper extremity, and a bilateral loss of position sense.

*Case 7.*—H. M. E. (No. 612595), a twenty-one-year-old woman, had had diabetes mellitus since the age of four years. From the beginning she had been difficult to control, and insulin reactions were not uncommon. About two years prior to her last admission she was requiring in excess of 100 units of insulin (regular) daily.

One year prior to her last admission to the hospital, the patient's breakfast and insulin were delayed until 11:00 a. m. After receiving her insulin and eating, she became drowsy and remained in a semicomatose state for a week. She could be aroused but immediately returned to sleep. She took little food, and her insulin (given by her mother) was reduced. During all this time, she had no sugar in her urine. By the end of the week the patient was somewhat less drowsy and was eating more regularly. It was not until the end of the second week, however, that she resumed her normal diet and had regained her usual activity. Although this episode took place at the patient's home, without attendance of physician or benefit of blood sugar determinations, it appears most probable that she had experienced a mild attack of prolonged hypoglycemia. No objective neurological signs could be detected following this episode, but a definite change in her personality occurred.

The patient has been seen periodically in the Out-Patient Clinic. She has continued to have mild hypoglycemic reactions which have been readily controlled with orange juice. Throughout this time her personality disturbance has continued, the patient manifesting frequent attacks of unmotivated laughing, with a definite inability to concentrate. The neurologic examination has continued to be negative.

## Discussion

This brief summary of our cases of hypoglycemia in diabetics readily demonstrates the

dangers of such reactions. There can be no doubt that definite cerebral damage occurred in all of these cases. This has been verified by the autopsy studies on the four fatal cases, and by the clinical observations on those that recovered. The potential dangers of hypoglycemia are accentuated by the fact that with our present knowledge one is unable to predict accurately when such a reaction will occur, since it is well known that the individual response to insulin may vary from person to person, and even within the same individual. It must also be kept in mind that with the increasing use of protamine insulin the usual prodromata of incipient hypoglycemia are frequently altered, and therefore not recognized by the patient or the family. Even more indefinite is our knowledge concerning which individuals can tolerate a hypoglycemic condition, since some will recover readily from fairly severe reactions, while others show definite cerebral damage with only mild attacks. One fact stands out from our studies, and that is, that any associated chronic disease that might affect brain tissue, such as alcoholism, arteriosclerosis, or prolonged chronic infection, will tend to make diabetics, when they develop hypoglycemia, much more susceptible to irreversible brain tissue changes. In such individuals one must be extremely cautious to avoid even the slightest degre of hypoglycemia and to treat these reactions, if they occur, immediately and adequately.

However, the dangers of hypoglycemia are equally or even of more significance in the younger age group, where frequently death does not ensue, but the reaction produces permanent brain damage with a resulting slow recovery and persisting disabilities in the neurological and mental spheres. Many of these individuals slip into hypoglycemia with little or no alteration in their insulin dosage, and are frequently misdiagnosed as diabetic acidosis and given more insulin. This additional insulin may be just sufficient to produce irreversible changes in an already hypoglycemic brain. In view of the distinct possibility of cerebral damage one must caution against a too hasty administration of insulin to a comatose diabetic. It is imperative, moreover, that the physician be extremely thorough in his directions to the diabetic patient concerning the use of insulin. And not only should these individuals be instructed in the possible dangers of hypoglycemia, but their families and attendants should be educated to recognize the prodromata of hypoglycemia, and to appreciate the absolute necessity of employing the proper precautions to prevent the development of a severe reaction.

Once the brain tissue has been damaged by hypoglycemia the return of the blood sugar to a normal or an elevated level appears to have little effect upon the course of the illness. Coma following hypoglycemia may persist for days and eventuate fatally in spite of a high blood sugar level. It is important, nevertheless, to maintain a normal or slightly elevated blood sugar level during this period since a great deal of the cerebral changes may be reversible and definite improvement may occur.

## Conclusions

1. The histories of seven diabetics believed to have had hypoglycemic cerebral damage are reviewed. Four of these cases terminated fatally, while the other three recovered, but presented persisting signs of brain damage.

2. Because of the distinct possibility of cerebral damage in any case of hypoglycemia one must be very careful in the directions given patients who are to use insulin. One must also be doubly cautious in the administration of insulin to a comatose diabetic until the possibility of an existing hypoglycemia has been eliminated.

The authors wish to express their appreciation to the Department of Pediatrics for allowing them to include Cases 5 and 6 in this report.

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## RADIUM TREATMENT OF CERTAIN RARE BENIGN CONDITIONS*

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RADIUM, with roentgen therapy and surgery, has its major importance and usefulness in combating cancer. In the last few weeks Dr. C. C. Little, head of the American Society for the Control of Cancer, has published a small book which as yet I have not seen. In the lay press, however, the author of this book is given as authority for the statement that in this country in the last five years, 30,000 patients with cancer have been cured by surgery, radium and roentgen therapy, and that these three methods of attack are the only scientific therapeutic methods known.

In recent years there has also been an interesting development in the treatment of benign conditions with radium. Many diverse nonmalignant diseases have been found to respond favorably to careful treatment with the powerful element.

Instead of describing the more common diseases treated with radium, it may be of interest to consider three quite rare conditions for the inherent interest in the disease itself as well as for the results attained. As this paper is general in character, the technical details of treatment have been omitted.

One of these rare conditions is congenital and hence is treated in infancy; the second condition occurs at any age, usually following a major surgical operation; the third disease is encountered in elderly men.

The first disorder to be considered is cystic hygroma of the neck, an exceedingly rare benign tumor with serious potentialities. Although first described by Redenbacher in 1828, case reports have been scanty. In 1913, Dowd collected ninety-one cases from the world literature. In 1934, Vaughn added sixty-four additional cases reported since 1913, and MacGuire, in 1935, added eight others. Hence approximately to date 163 cases have been found, only nineteen of which were in adults. Fleming sums up the knowledge to date very expertly and reports two additional cases in adults.

Briefly, cystic hygroma is a congenital condition usually first noted in the first four years of life. The symptoms are those of a simple non-inflammatory tumor; pressure may produce dyspnea and dysphagia. It is a thin-walled cystic, movable tumor, situated ordinarily in the lower half of the neck, containing lymph and lined by endothelium. Usually the tumor is lobulated, being made up of several separate cysts. It may, on occasion, extend to the mediastinum and into the axilla. It is usually bluish in color and translucent. These tumors are believed to arise from lymph sacs formed during the embryologic development of the lymphatic system. Diagnosis is not difficult if one keeps in mind the aforementioned characteristics, especially when aspiration of the tumor discloses lymph. Other conditions to be differentiated are branchial cysts, lipomas, thyroglossal cysts, deep-seated hemangiomas, aneurysms and infected lymph nodes.

Before the days of irradiation, treatment had been mainly surgical, although this attack was at times impossible and the results were often unsatisfactory. The tumor, in many cases, proved too extensive to resect; in others, isolated lobules were missed and recurrences appeared. From January 1, 1910, to December 31, 1937, inclusive, thirty-four hygromas of the neck have been treated at The Mayo Clinic, twenty by radium therapy, three by roentgen therapy and eleven by other methods, mainly surgical. Since

*From the Section on Therapeutic Radiology, The Mayo Clinic, Rochester, Minnesota. Read before the annual meeting of the American Therapeutic Society, St. Louis, Missouri, May 12 and 13, 1939.

the advent of radium therapy at The Mayo Clinic in 1915, treatment has been mainly with this agent, and practically entirely so since 1918. New, of The Mayo Clinic, was probably the first to report the use of radium in this disease. In 1929, Figi, of The Mayo Clinic, reported thirteen cases; twelve had been treated with radium and one excised. Of the thirteen patients, seven died between courses of treatment from acute inflammation in the tumor, always a dangerous complication. Three patients were entirely cured, one greatly improved and two considerably improved. Therapy consisted of the application of radium at a distance over the tumor; one to nine applications were given three or four months apart, four being the average number of treatments.

Fig. 1. Cystic hygroma on left side of neck of child aged six weeks. Picture taken in November, 1934, before treatment.

Fig. 2. Cystic hygroma. Same subject as in Figure 1. Picture taken in February, 1935, after the first treatment with radium.

Fig. 3. Cystic hygroma. Same subject as in Figures 1 and 2. Picture taken in August, 1936, after three applications of radium.

I now wish to report an additional nine cases treated with radium at The Mayo Clinic from January 1, 1929, to January 1, 1939. The youngest patient was six weeks old at admission; the oldest child was four and a half years old; one patient was an adult, aged forty years. This adult had had three surgical excisions during the past twenty years, elsewhere, with recurrences. Of this group of nine patients, one died of an acute infectious process in the tumor during a treatment. The adult patient obtained only slight improvement. Among the infants, five were entirely cured and two showed marked benefit. Figures 1, 2 and 3 depict one typical cured patient, a child aged six weeks on admission, with a large cystic hygroma of the lower left side of the neck. Disappearance of the tumor was achieved by three treatments with radium, three months apart. The photographs portray the condition before treatment and after the first treatment and the final result. In all cases, treatment consisted of radium applied at a distance, with a mild dosage below a skin erythema; in one case interstitial radium was also employed.

Acute parotitis, following a major surgical operation, has been recognized as a serious postoperative complication since 1878. The condition is rare; one survey showed the incidence to be about one in 2,275 general operations (Beckman). However, it is a very serious disease. Several hypotheses to account for the infection have been advanced; the one supported by animal experimentation is that infection spreads into the gland by direct passage of bacteria from the mouth along Stensen's duct, in individuals debilitated by a serious operation and when secretions are diminished by the administration of opiates. If unchecked, the infection spreads rapidly and fluctuation becomes evident. The condition may spread and become bilateral; incision and drainage may be required, or the abscess may rupture spontaneously, with a grave prognosis. Parotitis alone is a serious postoperative complication, but it is often accompanied by other serious terminal disorders, such as peritonitis, pneumonia and intestinal obstruction.

In 1935, Green reviewed the literature, and found the mortality of acute parotitis in the combined American statistics to be 58 per cent. Rankin and Palmer, of The Mayo Clinic, reported fifty-eight cases not treated with radium with a mortality of 39 per cent, and twenty cases treated with radium with a mortality of 20 per cent. In 1936 a study was published of 184 cases treated with radium at The Mayo Clinic from January 1, 1929, to December 31, 1934, inclusive, with a mortality of 19.6 per cent. Analysis of these cases corroborated the impressions of Rankin and Palmer: (1) Radium, when applied immediately to the infected region, tends to abort suppuration and reduce mortality.

(2) If surgical incision becomes necessary, the prognosis is more grave. (3) The greater the extent of the infection, for example bilateral parotitis, the higher the mortality. (4) The more serious the operation preceding the infection, the higher is the mortality.

Our treatment with radium in the last two years has been even more successful than in the earlier period, owing, I believe, to the more prompt recognition of the disease and the earlier institution of treatment. During 1937 we treated forty cases, with death in five instances, a mortality of 12.5 per cent. During 1938 there were twenty-six cases with two deaths, an 8 per cent mortality. Lessened mortality in any year may also be due to variation in virulence of the bacteria involved.

The third disease to be discussed is Peyronie's disease, first described by this physician to Louis XV in 1743. It is found in the literature under various names, as fibrous cavernositis, fibrous sclerosis, primary indurative cavernositis and plastic induration of the penis. The cause is still unknown, although syphilis, gonorrhea, trauma, gout and arthritis have all been suggested as causative factors. The findings are a plaque, nodule or cord, solitary or multiple, involving the sheaths of the corpora cavernosa and the septum, usually in the dorsum and midline of the penis. The urethra and corpus spongiosum are usually unaffected. The lesion is not tender and the skin is movable over it. It occurs in middle-aged and elderly men and causes deformity on erection or pain on erection, often rendering sexual intercourse difficult or impossible.

Peyronie's disease is comparatively rare, but Polkey found 549 cases reported in the literature by 1928. Treatment has been by means of surical excision, diathermy, roentgen therapy, iodides, fibrolysin and radium. Polkey found very poor results from all methods of treatment; in 419 cases in the world literature cures were obtained in seventy-six cases, or 18 per cent, and in addition 9 per cent were improved. During 1935, 1936 and 1937, we have been treating these cases with radium and have reported the results; this report is still in press. Thirty-four patients were treated during this period and a rigid, nonpartisan analysis of results showed cure in 19.3 per cent and improvement in an additional 32.3 per cent, thus obtaining better results with radium alone than with all methods combined. Two observations of value were an outgrowth of this survey: patients that had had two or three treatments a few months apart obtained far better results than had come from only one application; in other words, undertreatment had been a cause of failure. Secondly, the duration of the disease affects the prognosis. Our cured patients had had symptoms on the average for six months only; improvement was secured in cases in which the symptoms had been present for an average of twenty-one months; no effect was obtained when the symptoms had endured for an average of twenty-nine months before treatment.

An additional survey of last year's experience revealed that in 1938 we treated twenty new patients with radium, and twenty returned following previous treatments. Of this last group, one was cured, two were unimproved and seventeen showed improvement and returned for further treatment.

Peyronie's disease is not an important one and does not ordinarily progress beyond a certain stage of discomfort; however, it leads to much mental distress and neurasthenic states.

### Comment

Three diverse disease entities have been dealt with: cystic hygroma of the neck, acute postoperative parotitis, and Peyronie's disease. The first is a benign congenital tumor, the second an acute infectious process, and the third a chronic inflammatory condition. Different age groups are involved. The only similarity in these three disorders consists in their rarity and in the fact that they are nonmalignant and that cure or improvement has occurred with radium therapy.

One pertinent question is whether other methods of treatment of these rare conditions might also be effective. Surgical intervention has not proved of much assistance. Roentgen treatment would very probably serve as well as radium in cystic hygromas and should be also employed in more extensive cases in which the mediastinum and axilla are involved. However, these cysts occur in infants, and radium can be more easily and effectively applied. The blocks bearing the radium tubes can be easily taped over the affected region and will usually stay in proper position during the treatment. Under an x-ray tube the infants tend to change their position and

are difficult to restrain, so that accuracy of treatment is difficult.

Similarly, in acute parotitis, roentgen-ray therapy will serve if radium is not available. Again it is a question of ease and accuracy of treatment. The patients are seriously ill, not ambulatory, often in oxygen tents or may even be practically comatose. Radium can be brought to the bedside and accurately applied. We maintain an emergency service just for these cases.

In fibrous plaques, radium has been found most efficient when one employs highly filtered rays, screened with lead, shorter than those generated by x-ray tubes at ordinary voltages. Some cases have been helped by radium where previous roentgen therapy has failed.

Finally, it is interesting to speculate on the rationale of radium treatment of these rare benign conditions. The effect of the gamma irradiation of radium on malignant conditions is better understood; we know the usual lethal effects on rapidly growing cancer cells and even the relative sensitivity of different normal body tissues. Even different types of malignant growths have been studied in their differential response, so that it is often possible to diagnose the type of the malignant growth by a study of its response to irradiation.

Treatment of benign conditions has been a later study, and is not so far advanced. Cystic hygroma is a tumor containing lymph elaborated by the endothelial lining of the component cysts; the radium rays apparently destroy this endothelial lining so that further lymph is not produced.

Acute parotitis is an acute infectious process; treated at its inception, suppuration and abscess formation are aborted and resolution occurs. As Desjardins has suggested, the protecting wall of leukocytes, which forms around any acute infection, is broken up and destroyed by the rays; presumably, protective antibodies are liberated and the bacteria are killed.

We treat fibrous plaques as we do keloids. The German physician, Dreyer, in 1911, was among the first to develop this technic. The method is logical, as under the microscope a fibrous plaque is seen to be composed of elastic and scar-like tissue resembling a keloid, and we know that radium rays soften and absorb young connective tissue. Older keloids show deposits of cartilage and bone, as do long-standing fibrous plaques; these tissues are resistant to irradiation, and this doubtless accounts for our lack of success in treating long-standing fibrous plaques.

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### Patch Test for Children

One hundred and sixty-nine children at Sea View Hospital, Staten Island, New York, were given the Mantoux intracutaneous tuberculin test together with the tuberculin patch test and it was found that only one failed to react to the patch test who reacted positively to the Mantoux test. One hundred and eighteen additional children were tested in the pediatrics service at Mount Sinai Hospital in New York and the Mantoux test revealed no case which had not been discovered by the patch test. The value of the patch test for young children appears to be firmly established and it has the additional advantages that it never provokes a general reaction and never frightens either the children or the parents.—Vollmer, H, and Goldberger, E. W., Amer. Jour. Diseases of Children, Sept., 1938.

## CASE REPORT

# REGIONAL ILEITIS*

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Mrs. L., aged fifty-two, first came for advice on May 26, 1938. She complained that she had had considerable pain in her abdomen for four days. She had vomited once. The pain was worse after taking food, especially cold foods. All foods, however, caused distress. She recalled that she had noticed this pain for six weeks. Now she was suffering a constant pain. Alkalies gave no relief but instead caused her to vomit.

Twelve days later it was evident that she was vomiting more frequently. The pain now was located in the lower right quadrant. She had six watery stools on this day. A non-residue diet, with salol and bismuth, corrected the loose stool.

Gall bladder had been removed eight years ago and the appendix two years ago. There also had been a pelvic operation for retroflexion.

On June 13, 1938, the patient was admitted to the hospital. A barium enema at this time revealed a normal colon. Her temperature varied from 98.6 to 99.4.

A flat plate of the abdomen revealed normal kidneys, and no evidence of urinary stones. Some gas-filled loops of small intestine were visible in the upper abdomen; also evidence of free fluid in the abdomen. No mass could be felt.

Leukocytes numbered 17,000; polymorphonuclears 31 per cent; eosinophiles 41; small lymphocytes 17; large lymphocytes 9.

Stool examination showed no ameba, ova, pus nor blood.

Ewald test meal showed: free HCl 0; combined HCl 9; organic acids 4; lactic acid 0; occult blood 0; bile, trace; Boas Oppler 0.

Vomiting and pain in the right abdomen were pronounced.

Due to the x-ray evidence of gas in the small intestinal loops a diagnosis was made of post-operative adhesions following the appendectomy. Operation was advised. On June 22, 1938, under spinal anesthesia the abdomen was opened. A large quantity of free fluid was present in the peritoneal cavity. Three feet of the terminal ileum were found to be thickened, indurated and swollen—a hyperplastic type of ileitis. The wall of the bowel seemed to be three-eighths of an inch or more in thickness. Peristaltic waves were seen to pass along the involved ileum. About eight feet of the ileum were examined and even here, eight feet away from the cecum, the ileum was injected, but its lumen was good. At a point about five feet from the cecum an anastomosis was made with the transverse colon, side to side. The post-operative course was normal. She sat up on the sixth day. Seven days after the operation she began to have loose stools, due to the short circuiting. She left the hospital feeling quite well.

There was no more vomiting and the pain was less but loose stcols continued as we should expect. Fourteen days postoperatively the eosinophile count was 12 per cent, white blood cells 10,000, hemoglobin 87.

The patient was kept on a low residue diet for seven weeks. During this time the stool remained loose—a food diarrhea. After a residue food diet was given the stool became formed. Six weeks postoperatively there was no vomiting and only occasionally some pain. She felt stronger and ate well. Nine weeks after the operation there were no eosinophiles present. Seven months after the operation there was no vomiting. A mild attack of pain would come on twice a week. Two times in a month, the stool was watery but otherwise soft and formed. Her weight increased constantly. The only medication now was dilute hydrochloric acid for her anacidity. On May 10, 1939, ten and one-half months after the operation, she reported that she felt well, was still gaining weight, and there was no vomiting. The stool was soft and formed, and occasionally loose. A roentgenogram of the small bowel made at this time showed that all of the ileum was functioning, the barium meal filling the cecum and ascending colon and the ileum lumen being normal. By September 21, 1939, the patient had gained 14 pounds since the operation. There were loose stools at times, but no vomiting, and very little pain.

### Discussion

The only preoperative facts that we were at all sure of were: (1) some gas in the small intestine; (2) much free fluid in the abdomen; (3) eosinophilia; (4) a vomiting suggestive of low-grade small bowel obstruction; (5) an infectious process causing a mild fever and leukocytosis. X-ray examination findings following a barium meal were indefinite.

By way of differential diagnosis it was necessary to eliminate the presence of: (1) ureteral stone; (2) infected retroperitoneal lymph glands; (3) adhesions causing a kink following the appendectomy; (4) intestinal parasites.

On reëxamination of the roentgenogram of the small intestine after the surgical diagnosis of ileitis, it became increasingly clear that we had the finding on the film. Three loops of the ileum showed a distinctly narrowed lumen.

The terminal three feet of the ileum which were hyperplastic had a narrowed lumen so that when the short circuiting operation was done the food column went the route of least resistance into the transverse colon. By doing the anastomosis we diverted the liquid content of the ileum from that portion of the bowel which has absorptive qualities for reducing the liquid stool to a formed state. The watery stool was not an enteritis, but rather a food diarrhea, the liquid ileum content missing a portion of the absorbing chamber. The fact that she now has a formed stool

*Read before the Ramsey County Medical Society, Saint Paul, Minn., September 25, 1939.

is explained by our x-ray finding that the ileum is again functioning.

We felt that there was considerable significance in the high eosinophile count. In no place in the literature has it been mentioned. When in a disease process there is a 41 per cent eosinophilia present and fourteen days following a short-circuiting operation the eosinophiles drop to 12 per cent and one year later to normal it does seem as if one should include the eosinophilia in doubtful cases of pathologic lesions of the intestine.

Anemia was not present and this with a normal cecum on x-ray ruled out malignancy of the cecum and ascending colon.

Weber[8] reports: "Tuberculous enteritis has so much in common morphologically with the nontuberculous form with which we are primarily concerned here that the two are not always readily distinguished from each other even at gross pathologic examination. A search should be made for extra-enteral foci of tuberculosis." In the hyperplastic type the feel of the ileum is of a smooth, even doughy consistence, with no nodules at any place and no abrupt change from the pathologic to the normal, but rather a graded change. Up to 1932 these cases were considered to be tuberculous or fell into a nondescript class. Then Crohn[4] and his associates described this regional inflammatory disease of the intestine and named it regional ileitis.

Bargen[1] reëmphasized the lack of evidence for incriminating any particular bacterium as a causative agent of this condition. Obstruction and massive hemorrhages are also symptoms which are alarming. Perforation into a neighboring viscus occurs sufficiently frequently to be of considerable concern.

In those cases where there has been much loss of weight, Dixon[5] prefers to do a short-circuiting operation, ileum to transverse colon, and later a resection of the involved bowel together with generous removal of mesentery. Dixon states that occasionally permanent relief may be obtained by a short-circuiting operation but prefers the removal of the diseased bowel.

Clark[2] recites various symptoms which are found in the study of a group of cases. These symptoms are: a palpable mass, diarrhea, fever, obstruction, abdominal cramps, anemia, pain, blood in the stool, fecal fistula, arthritis and tarry stools.

In a study of thirteen cases of granuloma of the bowel, Pumphrey[6] reports on the bacterial causative agent and comes to the conclusion that these lesions may be caused by many different agents. The true etiology is unknown.

Crohn[4] et al outlined the physical findings as: (1) a mass in the right iliac region; (2) evidences of fistula formation; (3) emaciation and anemia; (4) the scar of a previous appendectomy; (5) evidence of intestinal obstruction.

The same authors stress the differential diagnosis of regional ileitis from ulcerative colitis of the proximal colon, fibroplastic appendicitis, lymphosarcoma, intestinal or mesenteric tuberculosis, Hodgkin's disease and carcinoma of the cecum. In this, the earliest pronouncement of ileitis, Crohn emphasizes that the disease involves only the terminal eight to twelve inches of the ileum and definitely not the colon, while in later articles the colon and jejunum also had been found to be involved.

In the original article Crohn et al recognizes the medical treatment as futile. Surgical resection of the diseased segment with the ileocecal valve and cecum is the treatment used by Crohn. He does not advise the short-circuiting operation. In our case an ileocolostomy has corrected nearly all of the clinical symptoms and pathologically according to the roentgenogram. To remove five or more feet of ileum did not seem to be good judgment. Crohn mentioned a very small amount of fluid being present in the abdomen whereas in our case there was considerable free fluid present.

In twenty-one cases studied, Coffey found three cases in which tuberculosis could be demonstrated and in these the roentgenogram of the chest also revealed active tuberculosis, and tubercle bacilli were present in the sputum. This author reports on the microscopic findings as being those of an exudative, proliferative, sub-acute or chronic inflammation, which at times suggest a Hodgkin's type.

In their summary of the literature, Ravdin and Johnston[7] collected their compilations from 289 different articles and have in a compact form presented this controversial subject. They give due credit to Crohn et al for having drawn the attention of the surgeon to the inflammatory lesions of the small intestine. In retrospect the surgeons reviewed their cases and in this way established an answer as to why an appendectomy did not cure the patient, why obstruction developed, and why fistulæ and tumors formed. Twenty-four articles are cited as describing typical cases of ileitis preceding Crohn's epoch-making article. Among the etiological factors given are: B. coli, B. dysenterial, tubercle bacillus, mycobacterium Johsei, bacterial toxins, viruses, protozoa, metazoa, achylia gastrica, allergy, foreign bodies, heredity and trauma.

## Conclusion

The etiology, bizarre symptomatology and surgery of region ileitis are discussed.

The genesis of this disease is being extensively studied but is at the present time unknown.

It has been called by various terms such as: regional ileitis, regional enteritis, Crohn's disease, terminal ileitis, regional colitis, non-specific granulomatous tumor, stenosing ileitis, stenosing terminal ileitis, segmental enteritis, et cetera.

Operation is the treatment of choice. If the involvement of the ileum is not too extensive, resection of the diseased portion is preferable; otherwise a short-circuiting operation had better be done.

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*(Continued on page 794)*

# HISTORY OF MEDICINE IN HENNEPIN COUNTY

BY A. S. HAMILTON, M.D.

THE first physician of Hennepin County, or what afterwards became Hennepin County, was Dr. Purcell,[1] who accompanied the army to Fort Snelling, in 1819, as surgeon, and remained here in that capacity for some years. All of the land on the west side of the river, where the major portion of Minneapolis now stands, was part of the military reservation and remained so until 1855, when it was thrown open for settlement. Provisional claims had been made, however, and settlers had been present even previous to that date. The first building[2] between the Mississippi and the St. Croix Rivers was a claim shanty, which was soon replaced by a log house, built by Franklin Steele in July, 1838, on the river bank abreast of the Falls of Saint Anthony. In the fall of 1847 Mr. Steele, who had established his preëmption claim to the site of Saint Anthony, consisting at that time of a blacksmith shop, a carpenter shop and five dwelling houses, one of which contained a small store,[3] began the erection of the first sawmill, which was put into operation in the late summer of the following year. At that time Saint Anthony with Little Canada, a settlement north of Saint Paul, was said to have a population of 571,[4] which we must look upon as having been a very liberal estimate.

In 1849 the population of Saint Anthony nearly doubled, and amongst those who arrived in that year were William R. Marshall, afterward Governor, and his brother. With pioneer promptness they came, hauled logs cut by their own hands in '47 on a previous visit, built two cabins therewith, and in one of them opened Saint Anthony's first real store. William R. Marshall surveyed and laid out the town of Saint Anthony, fourteen and one-half blocks up and down the river, and four blocks back. The street beginning opposite the Falls, now Third Avenue Southeast, was Cedar; then followed Spruce, Spring, Maple, Walnut, Aspen, Birch, and Willow, the last being now named Tenth Avenue Southeast. Up the river and parallel with it, were Pine, Mills, Bay, Linden, and Oak, now, respectively, First and Second Streets Southeast, Central, and First and Second Streets Northeast.

Of the second physician in Hennepin County, we have only a vague and somewhat mysterious record. Colonel J. H. Stevens came to Saint Anthony in April, 1849, as one of a party of ten, seeking a home. "The colony had a doctor, just entering manhood, who has since arrived at the highest pinnacle of his profession. A schoolmaster was also along, the rest were farmers. * * * There were no sick, so the doctor left in disgust. We had no children, so the schoolmaster went to another part."[1] Of this doctor, who came and went almost in a night, no further record can be found though we have searched for it long and carefully.

The first civilian physician of whom we can find any definite mention in Saint

1. Stevens Lyceum Address, 1856.
2. Statement of Dr. W. W. Folwell.
3. Northwestern Democrat, March 10, 1855.
4. Minnesota Year Book, W. G. LeDuc, December, 1851.

Anthony, was Dr. Ira Kingsley, an herbalist. Dr. R. J. Hill recalls him as a big man with a gray beard, who, as the city's first constable, in 1861 and 1862, used to patrol up and down watching for fires in Bridge Square, which was then the business center. Dr. Kingsley probably came in the Spring of '49, and does not appear at any time to have emphasized his medical attainments, figuring more frequently as a justice of the peace. He may well have been intimidated by the stern founders of Saint Anthony, who apparently felt that the presence of physicians would damage the reputation of Minnesota as a health resort, and strongly discouraged them at every opportunity. This pose on the part of the papers and public speakers is noticeable throughout all the early years of the settlement, and Mr. Goodhue, the brilliant editor of the first paper of the Northwest, the *Saint Paul Pioneer,* says, in an article called "Who are Wanted in Saint Anthony":[5] "Physicians, the *Express* [the Saint Anthony paper] does not want at all for any purpose, seeming to regard them as a fifth wheel of a coach in their profession and incorrigibly idle out of it."

Dr. Kingsley lived in a shack on Hennepin Island, the whole of which he claimed as he had jumped Franklin Steele's previous claim.[6] Later they compromised, and Dr. Kingsley took the southwest part of the Island, beginning near the Falls, and Mr. Steele took the remainder.

In spite of Dr. Kingsley's retiring disposition, and in the face of the opposition of the city fathers to medical men, his services were demanded in at least one emergency, the account of which has come down to us. The founders of Saint Anthony had made no provisions in their arrangements for a natural increase of population and for the conventional idea of womankind that on the occasion of a natural increase the presence of a physician is required. The first time we hear of a call for a doctor was in September, 1849, the result of a charivari at the wedding (the second in the settlement)[7] of Miss Amanda Huse and Mr. Lucius Parker. Across the road from Miss Huse lived Mrs. Godfrey, who at this time was hourly expecting confinement, and, hearing the ungodly noise, she must needs take it into her State-of-Maine head that it was Indians on the warpath, a thought of such disastrous consequences that Mr. Caleb Dorr, then boarding with the Godfreys, was dispatched post-haste for Dr. Kingsley, "Saint Anthony's only physician." Mr. Dorr's hurried exit effectually scattered the revelers. He took a small canoe and rowed to the island, where he found the doctor, but he met an unexpected difficulty when Dr. Kingsley refused to enter a craft which was quite evidently several sizes too small for him. Mr. Dorr, with a courage born of desperation, forced the physician to his knees in the old canoe, and paddled off with him before he had time to change his mind or posture. Says Mr. Dorr: "After a stormy passage [due more to the doctor's temperament than to the weather, we surmise] we arrived in Saint Anthony." Here Dr. Kingsley had the honor of presiding at the birth of the first white child born in Saint Anthony, Miss Harriet Godfrey, who is still with us (1936).

Dr. John H. Murphy, Saint Anthony's first regular physician, came up the river with his wife in the spring of '49.[8] He returned later to Rush Medical College, graduated, and began practice, probably at that time. He is mentioned in various lists of physicians as having become established here in 1850. Evidently he was not practicing in Saint Anthony in September, 1849, when Miss

5. Saint Paul Pioneer, June 26, 1851.
6. Notes on Early Saint Anthony. R. P. Upham.
7. Old Settlers' Address, Colonel Stevens, State Atlas, February 27, 1867.
8. Statement of Mr. Caleb Dorr.

Godfrey was born. The first medical advertisement found was in the *Minnesota Chronicle and Register* of September 23, 1850, and reads thus:

**Dr. John H. Murphy**

Front Street, a short distance below the mill, St. Anthony, Minn.

The world to which Dr. Murphy came was a very different place from the Minneapolis in which our pleasant paths lie. The west bank was practically an unbroken wilderness, as had been the east bank but a few months before. Goodhue gives us a good picture of Saint Anthony in 1850 when he says:[9]

"This place stands unprecedented in the record of its march for improvement. Less than ten months ago, after it was founded, the first house was built upon the lot given to the first settler. Now there are nearly one hundred buildings and six hundred inhabitants. The sawmill has four saws with a dam capacity of running eighteen; also a first rate lath machine. There are five stores in the place and one grocery. A fine steamboat is now building to take hundreds of delighted visitors next summer up the romantic Mississippi above the falls."

All around the little settlement was the primeval forest. Mrs. E. A. Chatfield says that in her childhood the boom of the falls was her lullaby in her home at the corner of Tenth Avenue Southeast and Fourth Street, and it is said that the sound was audible in Saint Paul. This seems almost incredible when we view today the remains of the cataract, but we must recall that it was a real fall in 1850, and, besides, there was little competition in the way of noise save that of the mills or a woodman's axe. But stay, we are forgetting another sound that at intervals broke the silence and which most of us have never heard and never shall:

"Crea-a-k, over one hundred Red River carts driven by dirty looking halfbreeds and laden with furs of all kinds from Pembina and the British possessions to exchange for a return load of groceries and life's necessities have drifted down past our office during the past week. This is no unusual occurrence and hundreds more will go by this season. What queer, quaint things they are, these wooden carts (without a nail or single piece of iron about them) and a sober plodding ox tethered to each with tow and leather strings, not a morsel of grease upon the polished oaken axle, and down the street goes the tortuous line of gypsies, Cr-rr-eak, sque-a-k, cre-r-rr-ea-k, a caravan of grimy pilgrims that seem a chain between civilization and savagism, and between the past and the present."[10]

These carts came down the Anoka road, squawked their way through Saint Anthony to Saint Paul, furnishing en route one of the chief sources of entertainment of the pioneer communities, a combination of movies, circus and brass band, especially the latter, only more so, for it is said they were audible three miles away. As they pursued the uneven tenor (and bass) of their way through Saint Anthony one summer day, their stolid drivers might have seen, as did Judge Lochren (who related it to Dr. Folwell and he to me), Dr. Murphy, happily unconscious of germs and as apathetic in regard to vermin as a modern trench surgeon, sitting on the steps of his office bandaging the heads of some Chippewas wounded in the battle of Shakopee, and surrounded by Indians and halfbreeds.

Here is another picture of Dr. Murphy at work, given by Colonel John H. Stevens, the first white settler on the west bank of the river:

9. Saint Paul Pioneer, January 23, 1850.
10. The Falls Evening News, July 16, 1859.

"The morning of April 30, 1851, was the coldest for the season ever known in the country. The wind was blowing from the north like a hurricane. The air was full of snow. The river bank was full and the waves were high. It was deemed almost impossible to cross the river either in a bateau, skiff, or canoe. It was necessary that I should have communication with Saint Anthony for the services of Dr. Murphy, who resided there, were required in my family. The aid of three as good boatmen as ever swung an oar, with Captain Tapper at their head, was secured. The question was anxiously discussed: Can any water craft at our command withstand the fierce wind, high waves and swift current? Captain Tapper thought one large bateau could weather the storm, but we were short of hands. Fortunately Rev. C. A. Newcomb, of the Methodist church, on the east side, joined us. He had remained over night with my neighbor, Calvin Tuttle. With much difficulty and some danger the crossing was made and they safely returned with Dr. Murphy. About noon on that bleak, cold, eventful day my first child and the first born white child on the west bank of the Falls, was added to my happy household."

Dr. Murphy would seem to have been of the type of man created for pioneer practice. With unquestioned ability, he possessed, in addition, a fund of vitality, good humor, wit, and high spirits, which are almost as necessary in a pioneer physician as medical skill. He always wore a Prince Albert coat, in one pocket of which he was said to carry a spool of silk, and, if there was any surgery to perform, he would take out the spool, cut off a piece of silk, sharpen his pocket-knife on the heel of his shoe, and say to the patient: "This is going to hurt and hurt like Hell, but I can't help it, so look out."[11] Much as they relied upon and valued his professional ability, however, his old neighbors are more apt to dwell in reminiscence on Dr. Murphy's social qualities, and so we hear of how a court,[12] with Murphy as judge, would suddenly find itself in session when a stranger made his appearance in the streets of Saint Anthony, and said stranger would unexpectedly discover that he was arrested for some such crime as spitting on the sidewalk—an impossible feat, not from lack of expectorative power in the pioneers, but owing to the absence of sidewalks. If he were a wise stranger he recognized his obligations and offered to treat the court, which immediately and joyously adjourned *sine die*.

Another glimpse we get of Dr. Murphy on the occasion of the marriage of the erstwhile widow Dorr to Dr. Jodon in '54. No wedding was complete without a charivari, apparently, and the choice spirits of Saint Anthony rallied on this occasion to do honor to the doctor and his blushing bride. Their most strenuous efforts to bring forth the groom, however, were unavailing until some bright citizen proposed the application of a board over the chimney as a powerful persuader. It was. A very irate man appeared, vowed vengeance, and in the morning was still breathing fire and brimstone and seeking to discover the perpetrators of the foul deed. The first person he met in his quest was one of the most confirmed practical jokers in Saint Anthony, which seems to have been well supplied with that article in this early day. The doctor was surprised and pained to learn that the charivariers included in their ranks the elite of Saint Anthony, chief among them Dr. John H. Murphy. Murphy and the others were arrested and appeared next morning in the police court. Dr. Jodon, whatever his medical attainments, certainly lacked a sense of humor. His name appears in lists of physicians sometimes as "B" and sometimes as "Z" Jodon, and I have seen a reference to the two Jodons, though assured by those who should know (Mr. Dorr and Dr. Foster) that there was but one—he came in 1853.

Doubtless, practice was scarce and living was hard, and many of the early

11. Statement of Dr. R. J. Hill.
12. James Mullen in "Old Rail Fence Corners."

physicians held positions which we can hardly accept other than as evidence of a need to increase their practice. Thus the *Minnesota Republican* of February 7, 1856, announced its gratification that Dr. J. H. Murphy has just been appointed by the County Commissioner of Ramsey County as physician and overseer of the poor of Saint Anthony, but the doctor had but a short time to profit by his new position, for the same paper of March 20, 1856, announces the annexation of Saint Anthony to Hennepin County. On June 24, 1858, Dr. Murphy purchased a stock of drugs and medicine from Mr. George A. Nash, but continued in practice.

Dr. Murphy was born in New Brunswick, N. J., in 1826, and read medicine with Dr. Abram Hull of Lewistown, Illinois. He attended Rush and graduated in 1850. The previous year he had located in Saint Anthony and began practice and made his home there until near the close of the Civil War. In the summer of 1861, when Dr. Stewart, surgeon of the First Minnesota, was captured at Bull Run, Dr. Murphy took his place and served in that capacity for six months. He then became surgeon of the 4th Infantry—connected with the 17th Army Corps, General McPherson commanding—and served as division surgeon most of the time. In the summer of '64 he had a sunstroke and had to come north. He later became surgeon of the 8th Minnesota Infantry operating against the Indians, and served there until the end of the war. During the latter part of this time his family moved to Saint Paul, which was his home after 1864. Subsequent to 1870 he served as surgeon general to the state for many years.

A note of November 1, 1851, says that Dr. Murphy has returned from the National Medical Convention at Saint Louis, where 500 medical men had been in attendance.

The *Saint Anthony Express* of November 1, 1851, introduces to Saint Anthony a man who was to play a very important part in the development of the two towns and to be the pioneer of the profession on the west side of the river, as Dr. Murphy was on the east. This advertisement announces his arrival:

> Drs. Murphy and Ames will continue the practice of his *(sic)* profession in Saint Anthony and vicinity. Office—(etc.)

The actual partnership was formed October 27, 1851, and was dissolved sometime in April, 1853, or shortly before that date. And here is the editorial notice which the *Express* condescended to bestow on a mere doctor:

> Dr. A. E. Ames at this time is a resident of Saint Anthony, and it is to be hoped permanently. By a reference to our advertising columns it will be seen he has formed a business connection with Dr. Murphy. Dr. Ames brings with him the esteem and best wishes of a host of friends, among whom are some of the most prominent citizens of Illinois.

Dr. Ames was a graduate in the first class from Rush and came to Saint Anthony from Roscoe, Illinois. He had been assistant secretary of state in Illinois for four years. A volume might be written about Dr. Ames and his beneficent activities in Minneapolis. Stevens says of him: "He held many offices without stint or limit." He most assuredly did, but, after all, perhaps no more beautiful tribute can be paid him than was given by Mrs. Hannah Munson when she said: "He was awful good to poor folks, was Dr. Ames. Never charged them nothing and was as good to them as to richer people." Immediately on his arrival here he filed a claim on the west side of the river, and moved there in 1852.

Dr. Hezekiah Fletcher also came in 1851, and became a prominent citizen of old Minneapolis, though not especially in a medical way. He was the third man to take a residence claim on the west side of the river, as well as the third man to represent Hennepin County in the legislature in 1854; he was the first Justice of the Peace, and was a director of the Hennepin County Bible Society. His name appears occasionally in lists of physicians, but he is said to have been principally interested in real estate. He built a small house on a site which is now Portland Avenue, between Fourteenth and Fifteenth Streets, at that time considered far back in the country.

Prior to 1854, the citizens of the west bank were compelled to accept and forward their mail from the office in Saint Anthony. In 1854 Minneapolis was given a postoffice, and Dr. Fletcher was made postmaster, but the government did not extend the mail route across the river until eighteen months later. The river was crossed only by a ferry, and, during these months, Dr. A. E. Ames, whose professional duties called him to Saint Anthony almost every day, brought the mail over in his hat or coat pocket, and it was distributed by Dr. Fletcher in a little building on the corner of First and Helen Streets.

In 1863 Dr. Fletcher was appointed registrar of the U. S. Land Office, and in 1867 he removed to Missouri and ultimately died in California.

In 1851, too, came Dr. N. E. Morey, whose card "respectfully offers his professional services to the City of Saint Anthony and vicinity. Dr. Morey will attend to all operations in the practice of dentistry when not engaged in the practice of medicine and surgery. Dr. Morey can be found at all hours at his office on Main Street near Mr. Russel's store." Certainly, Dr. Morey was not likely to be caught by the gentleman who is on the lookout for those with idle hands.

Advertisements in these old papers were at times quite flowery, and were, as we shall see later, even poetical. But this one, though not medical, is not so far removed from surgery, since it is the work of the barber, or shall we say a tonsorial artist?

> Mr. Highwarden, Saint Anthony's hair dressing saloon, late from Saint Paul, gives notice to the bearded people of Saint Anthony that he has opened the rooms in their flourishing and enterprising town [subtle flattery from a former citizen of Saint Paul] for the practice of the tonsorial art in all its varieties and manifestations, including plain and ornamental shaving [into what dreams and nightmares of sidebeards, goatees, imperials, and chin draperies does this not lead us?], capillary amputation and shampooing.

What was the fate, one wonders, of this bombastic Highwarden? He sounds as if he had just escaped from one of Dickens' novels.

There would seem to have been no farther addition to Saint Anthony's medical ranks in 1851, which, perhaps, was just as well, since the papers and public speakers were still loudly vociferating that there was no work for them and to stay was to invite starvation. The Saint Anthony paper must have been edited by an early brand of Christian Scientist or else the editor was "blind of an eye," for while his editorials loudly proclaim that no one dies in this splendid climate save of old age, the news items in almost every issue chronicle deaths from tuberculosis. Further light is thrown on this situation by an article of Dr. Mattocks in the *Northwestern Medical and Surgical Reporter* of September, 1871, Vol. 2, No. 3. Mattocks quotes from the *Philadelphia Medical and Surgical Journal* a statement that the climate of Minnesota had changed in the past fifteen years and that, on account of the cutting of the pines, the climate was no longer suitable for tuberculosis. Mattocks denied that there had been any

change, and also quoted from the Secretary of the Y.M.C.A. of Saint Paul as follows: "Our Association has spent hundreds of dollars the past year, without counting the days and nights of watching, in providing homes, comforts, and coffins for Christian young men who have come here from Boston in search of health, but in reality have found only a grave." Perhaps the safest deduction from the whole discussion is that the climate never had been especially suited for tuberculosis.

It may be that this unfriendly attitude was not limited to the medical profession, for the *Minnesota Democrat* of July 26, 1856, calls on the citizens to "put the laborer and farmer into power," to scratch the names of attorneys appearing on the tickets, and "to assist in the extermination of all political hybrids whose sole object is their own aggrandizement at the public expense."

However, the doctors would appear to have gone their quiet way, calmly awaiting the issues of life and death. If they received no encouragement from the local press, they were at least not flayed alive, as happened to an unfortunate professional brother in Saint Paul who fell foul of Mr. Goodhue with the following sinister results:

"Dr. C. Rich and family (he professed to be of the eclectic school of medicine) left by the Nominee last week, being in debt to many people in Saint Paul and especially to the printer. This reminds us of the old maxim, 'Riches take to themselves wings and fly away,' and we cannot help heartily and meekly responding, 'Give us, Oh Lord! neither Poverty nor Riches.' Cheerfully would we forgive any poor fellow in debt who was man enough to say, 'Sir, I owe you, but am poor and I cannot pay you.' As for that man, dressed in black broadcloth, this office will try to have the man's character properly appreciated wherever he may go.

"Dr. Rich is about thirty-three years old, five feet ten inches or eleven inches high, slender, bilious, black hair, black eyes, smells like an apothecary shop, and looks like the ghost of bilious fever. Wherever he finds employment as a physician there will be employment for the undertaker, and, if he does not lose his patients, it will be because he can find none. As a surgeon he would only do to call in case of broken neck or a shot through the heart; or as a physician in the last stages of cholera or consumption when it is too late. But to do him justice, he was a very good collector of his own fees, and would take the last shirt from any poor patient who by accident or miracle survived his treatment."[13]

No doubt the members of the Saint Anthony profession, on reading this, felt that the studied indifference of the local press was not without its compensations.

The year 1852 was an uneventful one as far as the medical profession was concerned, except for the arrival of Dr. Charles L. Anderson, who appears to have been the only addition to the list of physicians. He arrived in May from Indiana. Stevens gives the following account of him:

"He was a geologist, entomologist and florist of rare industry and attainment. He contributed many articles to the press. Early in the sixties he moved to the Pacific slope. Tarrying a few years in Nevada, he made there a very complete catalogue of flora. For twenty years he has been resident in Santa Cruz, California, where his skill and attainments as a scientist are widely appreciated. His two daughters are talented in a literary and artistic way."

I am indebted to Dr. Thomas S. Roberts for some interesting facts in reference to the relation of Dr. Charles L. Anderson to Henry D. Thoreau. Some time during the year preceding Thoreau's death, he came to Minnesota in search of relief from tuberculosis, lived with a farmer near Richfield, and botanized about Lake Harriet and through that district. In a collection of essays

13. Saint Paul Pioneer, September 4, 1851.

published by F. B. Sanborn in 1917 as a part of his biography, Thoreau speaks frequently of Anderson and of the pleasure he had in knowing him and going about with him.

Investigation of the local press shows many medical and semi-medical contributions by Dr. Anderson during his residence here. In the *Minnesota Democrat* of October 25, 1856, Dr. Anderson has an article entitled, "Agriculture west of Minneapolis." He speaks of the "Big Woods," the beautiful trees, the different varieties with their Latin names, and prophesies that at some distant time our richest farms will be in these woods.

The *Express* of January 3, 1852, has this item which is not uninteresting as showing conditions in the settlement and also the tone of the press toward physicians:

"In reply to a letter as to the number of inhabitants of Saint Anthony we can only venture an approximation. Last spring we numbered a thousand. Since then Dr. Murphy informs us he has assisted at seventy births, in all of which both mother and child are doing well. As we have five other physicians in the place, allowing each an equal number would give us a natural increase of three hundred and fifty. [Note the sophistry, as Dr. Murphy had an overly generous portion of the practice of the city.] In regard to the health of the place, a most satisfactory report may be given. People who comply strictly with the laws of health and do not employ a doctor never die except of old age."

This is one of the ways in which the Saint Anthony census was padded.

Here is another piece of news from a February, 1852, paper:

"The Legislature of Minnesota is composed of three farmers, five lumbermen, eight merchants, one innkeeper, four bookkeepers, two lawyers, one mason, one painter and two physicians. - - - Drs. Day and Murphy are the first disciples of Æsculapius that ever had the honor of representing the people of Minnesota in the collected wisdom of the territorial fathers."

Hennepin County (on the west side only of the Mississippi) was organized October 21, 1852. Colonel Stevens says:[1]

"At the election held at my house eleven days previously, there were seventy-three votes polled which comprised about half the voters. At a mass meeting held previous to the election the citizens nominated, irrespective of party, the following: A. E. Ames, Representative, etc. * * * All of these candidates positively refused to stand but the meeting positively refused to excuse them. They were elected and were the first officers of Hennepin County. The first physician in the county was Dr. A. E. Ames, who dates this part as his home from October 18, 1851."

A territorial temperance society was instituted in this year by Drs. Fell (dentist), Fletcher, and Ames, and the latter, during the same year, was made contract surgeon at Fort Snelling.

The year 1853 saw three additions to the medical ranks—Drs. A. E. Johnson, Z. or B. Jodon (he of the charivari), and Dr. J. A. White. We have few data in regard to Jodon, but Johnson became one of the prominent physicians. He was an inveterate smoker and always had a long meerschaum pipe hanging from his mouth. The following story is told of him, and may serve to illustrate some of the rough-and-ready ways of pioneer physicians. On one occasion when Johnson was testifying in court, the judge announced the hour of closing, but Johnson said: "Hold on a minute, I have a little more to say," and went on with his testimony, and, when done, said to the judge: "Now, that's all, you can go."

Dr. Johnson was born in Oneida County, New York, in 1825. As a young man he came as far west as Illinois, and then returned to New York to study

medicine at Columbia. He was persuaded by Dr. Ames to come to Saint Anthony, and continued to practice here forty years. He was a naturalist and ethnologist and, according to Neill, the founding of the Minneapolis Academy of Natural Sciences was largely due to Dr. Johnson, though Drs. Simpson, Ames, W. H. Leonard and Hatch were also active, the latter especially in ornithology.

The *Falls Evening News* of June 4, 1859, reports that the "popular chess factory of Dr. Johnson in a freshet had been wrenched from its moorings and carried down the stream," from which we assume that the doctor was also a chess enthusiast.

The *Minnesota Republican* of October 19, 1854, has a card from Dr. Johnson, calling attention to the fact that he gives special attention to the eyes, which is the first reference I have found to local specialism in medicine in our modern sense of the word "specialism," though there are many instances of doctors giving special attention to "chronic diseases," "scrofula," "neuralgia," et cetera. On February 22, 1855, Dr. Johnson announced himself as an "occulist," and, at the same time we find him dropping into poetry in a friendly way, thus:

> Dr. A. E. Johnson, Occulist *(sic)*, would say to those who exclaim with Milton:
> A drop serene hath quenched my orbs
> Come then and
> Take thou some new infection to thine eye
> And the rank poison of the old will die.

Evidently, Dr. Johnson was here vaguely suggesting our modern views of vaccine therapy.

Campbell's Directory of 1875 gives the following eloquent testimony of the interest of the early physicians in scientific matters. Minneapolis Academy of Natural Sciences: A. E. Johnson, President; S. S. Peckham, Vice President; A. F. Elliot, Secretary; P. L. Hatch, Corresponding Secretary; Charles Simpson, Curator.

The *Minnesota Republican* of April 30, 1857, reports that Drs. Johnson and Le Boutellier of Saint Anthony have become editors of the Agricultural Department of the *Minnesota Democrat* and the *Saint Anthony Express*, respectively.

Dr. J. White was a graduate of the Medical College of Brunswick, Maine, and practiced here to his death, which occurred in 1856, at the age of thirty-three.

In the *Saint Anthony Express* of February 4, 1854, we find the following note:

> "We requested recently of Dr. Ames a statement of the number of deaths in Hennepin County the past year. The following was handed us by him in reply thereto. We believe Dr. Ames is the only practicing physician in the county and our readers may be assured it is correct. Hennepin County has a population of over 2,000 and it appears there were six deaths during the past twelve months in the whole county. * * * The County of Hennepin is situated on the west side of the Mississippi and between the Minnesota and the Crow Rivers, containing an area of 25 to 35 miles."

*(To be continued in December issue.)*

# President's Letter

THE coöperation of the doctor is required in these days in many matters of public interest that are not exclusively medical problems.

Civic bodies are calling upon the medical profession more and more frequently for advice and assistance and the Minnesota State Medical Association has responded with two new committees within the last few months.

One of them is the committee to study further legislation for the control of potential sex criminals. This committee was requested by the House of Representatives at the last session of the Legislature. It will work with a corresponding committee from the Minnesota State Bar Association in the hope of finding a permanent solution in the law to the serious problems of sex crime.

Another is the Committee to Study Motor Vehicle Accidents. The work of this committee will have particular reference to practical tests for alcohol in order to assist in coping with the problem of the drunken driver. The committee will make its own studies of the subject and coöperate with police authorities to help in eliminating the drunken driver as a factor in automobile fatalities.

Still another committee of immense importance to the public health at this juncture will be appointed by the incoming president after the first of the year to promote vaccinations and immunization among the children of Minnesota. Physicians all over the state recognize the need of a concerted campaign for this purpose on the part of organized medicine. It is hoped that this committee will study practical ways and means and make concrete recommendations to county societies, which should be the agencies to set the work in motion.

There is a double fitness in the choice of the respiratory diseases as subject of the month for November. It is in November that the common cold, influenza and the pneumonias become acute seasonal problems and November signalizes also the opening of the annual Christmas Seal campaign for the control of tuberculosis.

The Minnesota State Medical Association has coöperated in this campaign for many years and wholeheartedly endorses the public education campaign which is financed by the sale of Christmas Seals.

Through the Christmas Seal and the educational campaign it finances, the citizens of the nation have been aroused to the problem of tuberculosis. Today, as a result of the effort, doctors and health departments are no longer working alone on the tuberculosis problem. The whole body of citizens is participating in the fight with tangible results in greatly reduced death rates from tuberculosis.

We are greatly indebted to the Minnesota Public Health Association for its aid in our campaign and for its coöperation with the practicing physician and the State Board of Health in the control of tuberculosis in Minnesota.

GEORGE EARL, M.D., *President*
Minnesota State Medical Association.

# EDITORIAL


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BUSINESS MANAGER
J. R. BRUCE

Volume 22 NOVEMBER, 1939 Number 11


## THE STORY OF SULFANILIMIDE

FOR years an extensive search had been going on without success for a drug which would kill bacteria in the human organism without harming tissue cells. With the exception of a few specific remedies for such diseases as malaria and syphilis, proposed drugs proved a disappointment.

The story of the discovery of the therapeutic value of sulfanilimide and its allied drugs in the treatment of a variety of infections, as told by Long and Bliss,* is the story of the gradual addition of evidence of the efficiency of these dye-like preparations until it became incontrovertible that the long looked for remedy had been discovered, making an epoch in the history of medicine.

Certain dyes have been known to be bactericidal *in vitro* since 1913. A period of almost twenty years was to follow before experimentation was to prove the effectiveness of prontosil *in vivo*.

Sulfanilimide was first synthesized in the dye industry in Germany in 1908. Experimental work with prontosil was first carried out in Germany in December, 1932, but was not reported until Domagk made his epoch-making contribution in the *Deutsche Medizinische Wochenschrift* of February 15, 1935. In the meantime, however, a few German clinicians had been using the drug with some success, evidently emboldened by the demonstration of its value in preventing the evolution of fatal hemolytic streptococcic infections in mice and curing streptococcic infections in rabbits when given by mouth.

The first report of the remarkable clinical qualities of prontosil was that given by Foerster, May 17, 1933, before the Dusseldorf Dermatological Society, when he reported the cure of a ten-months-old infant suffering from staphylococcic septicemia. Strangely enough, the drug was first used in a staphylococcic infection and then apparently only in desperation.

Following the report of experimental and clinical use of prontosil in the *Deutsche Medizinische Wochenschrift* of February 15, 1935, the French and English became interested. Unable to obtain the drug from Germany, the French synthesized similar drugs known as septazine and rubiazol and most of their reports, until recently, are concerned with the use of these drugs.

In 1936 reports of experimental and clinical use of prontosil began to appear in England.

*Long, Perrin H., and Bliss, Eleanor A.: The clinical and experimental use of sulfanilamide, sulfapyridine and allied compounds. New York: Macmillan, 1939.

Prontosil was found to be ineffective against streptococci *in vitro*, but had growth-retarding power in the blood of patients. It was Whitby and others in England who first demonstrated the value of sulfapyridine in experimental pneumonococcic infections in mice.

In the United States prontosil was first used in 1935 by Dr. A. Ashley Werch in the Babies Hospital in New York. A few other clinicians used it the same year but it was difficult to obtain. No mention of the drug appeared in the literature until an abstract of a French article appeared in the June 13, 1936, issue of the *Journal of the American Medical Association*. It was not until 1936 that laboratory and clinical investigations were seriously undertaken in America. In November of that year Long and Bliss reported, before the Southern Medical Association at Baltimore, the slight bactericidal action of sulfanilimide *in vitro* and its bacteriostatic action *in vivo* and confirmed European reports on prontosil, prontosil S and sulfanilimide.

The Council on Pharmacy and Chemistry of the A.M.A. suggested the name sulfanilimide April 17, 1937, and accepted the drug July 31, 1937.

Chemotherapy is in its infancy, but it is not unlikely that it will continue to replace established therapeutic procedures and will be found to be effective in an increasing number of infections. The profession cannot, however, be blind to the occasional unfavorable reactions encountered in the use of the various compounds.

## THE NURSING PROFESSION

THE nursing profession has its difficulties like every other profession and occupation. The demand for nurses is seasonal and, while compensation during employment is adequate, the yearly average income of most trained nurses is not commensurate with their value. With the onset of the depression there was widespread unemployment in the nursing ranks, and even suffering. With the closing of many training schools in Minnesota there has been evidence of a dearth of available trained nurses at times in certain localities. At the present, the supply is abundant.

The whole trend of the training of nurses in recent years has been to increase the preliminary requirements as well as to raise the quality of the curriculum in training. Some have thought the trend has gone too far in the matter of nonessentials. The matter lies in the hands of the nurses, and perhaps no one can blame the leaders in the profession for attempting to turn out a highly finished product. Certainly the medical profession is trying to do the same thing.

The greater the professional training the higher the financial compensation justified. No physician believes the trained nurse is overcompensated when she cares for certain acutely ill individuals. Other factors, however, must be considered.

A goodly proportion of the population simply cannot afford the services of a trained nurse, and for that matter, the fees that a physician may feel his service is entitled to. Most physicians adjust their fees to the patient's ability to pay, but that is not allowed by the nurses' organization and is admittedly not quite a comparable procedure. Also, certain patients do not need the services of a highly trained nurse, and yet they need someone to carry out the simple procedures entailed in the care of those suffering from a great variety of chronic illnesses.

As a result, the more or less self-styled practical nurse has come into prominence. In most cases, with little education and no formal training, this type of nurse has met a very definite demand at a fee considerably lower than that paid the trained nurse. In a sense the practical nurse is in competition with the trained nurse, but just as truly she meets a different need. She finds her employment for the most part because of satisfactory services rendered, or through some employment agency separate from the trained nurses' organization.

Impressed by the undesirability of so many uneducated and untrained women caring for the sick, the New York legislature has passed a bill requiring certain qualifications and providing for licensing for practical nurses. The law also provides penalties for those acting in this capacity without license. The desirability of legislating against a woman with little qualification caring for the sick for compensation may be open to objection, however desirable the establishment of a group to be known as practical nurses with certain minimal education and training may be.

Other states, Minnesota included, will doubtless follow the practical application of this law with interest.

As a matter of fact, there is a very definite need in both rural and urban localities for a type of nurse with some training but available at a rate lower than the trained nurse. It would be well if some solution of their training and registration could be evolved. Perhaps this is a problem the medical profession should help to solve. —C.B.D.

## MINNESOTA MEDICAL FOUNDATION

A GROUP of medical alumni headed by Dr. E. S. Platou, president of the Minnesota Medical Alumni Association, have had drawn up articles of incorporation for a Minnesota Medical Foundation. The purpose of the Foundation is the establishment of an organization, composed largely of medical alumni, which will be able to work for the betterment of the medical school of the University of Minnesota.

The purposes of the Foundation, as stated in the articles of incorporation, include activities for the betterment of the community (meaning the state at large) through the furtherance of undergraduate and graduate medical education and medical research. Specific activities as stated at a preliminary meeting of some hundred medical graduates, held October 10 at the Continuation Center, included financial aid for needy medical students, financial assistance in keeping outstanding members of the medical faculty from going elsewhere because of offers of higher salaries, publicity activities in disseminating information through members throughout the state, et cetera.

Membership will consist of four groups: Foundation Associates to consist of contributors of $1,000 or more; Life Members to include those contributing $100; Supporting Members who pay annual dues to be determined at a later date; Student Members who will pay nominal dues of $1.00. The first three groups will be voting members.

In addition there will be a Board of Trustees, twelve in number, the majority to be medical alumni. There will be a president, vice president, secretary and treasurer. The first officers will be: Dr. E. S. Platou, president; Dr. M. B. Visscher, vice president; Dr. R. L. Wilder, secretary; and Dr. J. C. Litzenberg, treasurer.

One of the functions of the Foundation will be the issuing of a bulletin, not for publication of scientific articles, but primarily to acquaint members with medical school activities, thus bridging a gap which has existed since the medical school began. Only a relatively small group of medical graduates have been able to keep in close touch with the medical school and the majority of medical alumni have had absolutely no contacts.

No other medical school has attempted any such organization as this proposed Foundation. Those who heard of the project for the first time at the October 10 meeting were most favorably impressed, and the proposal received the enthusiastic approval of the Minnesota Medical Alumni Association at its annual meeting October 14. This Foundation will offer a tangible opportunity for the alumni and interested friends of the Medical School of the University of Minnesota to exert an influence for the improvement of medical education and research. Through a separate corporation they will be able to direct the expenditure of funds in accordance with the wishes of their donors and in the light of the best judgment of the membership of the Foundation.

The Foundation has as its most important immediate objective the reëstablishment of contact between alumni and the medical school. Its members and officers believe that when the work of the school is better understood there will be many physicians and other public spirited citizens who will be anxious to lend support to its further work.

## Regional Ileitis

*(Continued from page 781)*

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# MEDICAL ECONOMICS

**Edited by the Committee on Medical Economics**
**of the**
**Minnesota State Medical Association**
**W. F. Braasch, M.D., Chairman**

## SICKNESS INSURANCE—PENNSYLVANIA; CALIFORNIA

The Medical Society of the State of Pennsylvania is about to launch its own voluntary insured medical service on a statewide scale.

Information about the Pennsylvania plan is appended to an extensive printed report of the Pennsylvania Survey of Sickness Service and Facilities which has just been published under the title, "Are the Citizens of Pennsylvania Neglected When Sick or Injured?"

The survey presents detailed findings in each county and subjoins a review of the extensive program of the state medical society and cooperating agencies to take care of the sick and needy in Pennsylvania.

The general program duplicates in most respects the program pursued by Minnesota physicians with the exception of the fact that the physicians in Minnesota will not experiment with voluntary sickness insurance, at least until such insurance has been demonstrated as successful in other states or until the need for it in Minnesota is so obvious that society officials feel justified in moving into these uncharted fields.

### In Effect in 1940

Enabling legislation which cleared the way for it in Pennsylvania was passed last spring. The plan will probably be put into effect in January, 1940. It offers much the same benefits as the Michigan plan (detailed in this section last month). Premiums are comparable and the service is limited to single persons with incomes of not more than $30 weekly, to married couples with incomes of not over $45 weekly, and to families of three or more with an aggregate income of not more than $60.

### Hospital Service in California

In this connection it is also interesting to note progress in California with a considerably cheaper, state-wide, medically sponsored voluntary plan.

In California, for a $1.00 registration fee and $2.50 a month, or $2.00 a month plus the regular fee for the first two visits, the single patient receives not only medical care for most illnesses but also hospital service. The upper income limit of eligibility is $3,000 yearly. Ninety cents of the patient's premium goes to the hospital association for hospital service. All physicians are invited to join by paying a $5.00 initial fee and more than 5,000 are said to have enlisted in the service.

### Radicals Want Government Service

The political situation, as always, is an important factor in this development in California. Californians, themselves, predict that compulsory sickness insurance will be a major issue in 1940 regardless of the success of the voluntary system. In the meantime, the support for the state financed system seems to have been split. Moderates are disposed to see how the voluntary system works before taking legislative action. Radicals want a state supported system, come what may.

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## ". . . WHERE THE BEST WORK IS DONE"

In all discussions of medical care and its adequacy there is a tendency to look for abstruse new reasons for age-old conditions; to intrude complicated sociological observations into relationships that are essentially simple and obvious.

Thus, when the student of sociology and economics finds a high percentage of illness and preventable deaths he is quite likely to cast about for irrelevant reasons. He digs up the fact, for instance, that 90 per cent of the population in the given area has an income of less

than $800 a year. Or that there is only one doctor to every 1,000 persons in the area or that there is only one hospital bed to every 1,000 persons. All of these facts are of interest, certainly. But they leave out of account a simple and obvious probability. If there is too much illness and death, judged by the common standard in any locality, and if the rates are rising, the first question to ask is surely, what about the quality of medical service in that area?

**Morbidity Rates Go Down**

If the doctors of a district or a state or a nation are alert, well-trained, conscientious and unhampered, morbidity and mortality rates are nearly always found to go down regardless of other factors. When the quality of medical service is lowered, the rates go up.

This simple relationship was pointed out emphatically by Dr. Grant Fleming, director of the Department of Public Health and Preventive Medicine at McGill University, in an estimate of the situation in Canada before a recent meeting of the Canadian Public Health Association.

"We find," said Dr. Fleming, "that for a period of years the infant mortality rates in some provinces are much higher than those in other provinces. The same may be said in regard to tuberculosis mortality rates. These rates show principally that medical care in its broadest sense is inadequate in certain provinces.

**Bears Repetition**

*"It is so easy to offer as an explanation for such an undesirable state that there are some inherent economic conditions in certain areas and provinces that account for the high rates. The interesting observation is that the lowest rates are always in the areas where the best work is being done.* It is quite true that local conditions may increase the difficulties. But that is all. If medical care is adequate, good results will follow as surely as sunshine follows rain."

This is a truth that will bear repetition now, as government bureaus gather their forces for dealing legislatively and administratively with morbidity and mortality problems in the United States.

If doctors and hospitals are allowed the freedom and support they need to do good work, morbidity rates will continue to fall; lives will be saved in spite of inconceivable difficulties. If they are hampered in their work and standards are lowered—even though new facilities are built and more doctors are hired—no real improvement can be looked for in the health of the people.

**Their First Concern**

No one, least of all medical men, discounts the rôle played by poverty in sickness, nor the need for adequate hospital beds and a sufficient number of physicians. Figures support them, however, in their contention that the first concern as doctors should be to protect and improve the quality of practice since quality is the *sine qua non* in every country for the control of sickness and death.

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## ILLEGAL AND UNSATISFACTORY

Minnesota's system for care of the relief client is well established in the law and it has operated since the enactment of the "choice-of-vendor" clause to the benefit of both patients and doctors.

Shortage of relief funds has been reported in many counties of the state, however, and a few county welfare boards are now reported to be dallying with the temptation to restore the county physician for care of relief patients as a means of cutting relief costs.

To the hard-pressed welfare board member, any way that offers ostensible savings looks desirable. Usually he has had no experience with the county physician plan himself. He is only vaguely aware of the objections to the system and he is quite likely to listen to advisers of the board who believe that the choice-of-vendor clause in the law can be circumvented by technicalities.

It is the hope of officials of the Minnesota State Medical Association that a clear and definite statement defining the law and the policy of the Division of Social Security may soon be made by state officials.

In the meantime physicians in every community where the going is difficult should do what they can to assist relief officials. They should work closely with the board at all times so that costs can be kept at a minimum. They should also point out to county officials the

illegal and altogether unsatisfactory nature of the county physician plan for the care of relief patients.

## MINNESOTA REGULATION UPHELD

Citizenship has been required for some time in order to obtain a license to practice medicine in Minnesota. This requirement is not in the statutes. However, it is a regulation of the State Board of Medical Examiners, instituted and enforced because the Board was certain that it would be upheld in the courts if it should be brought under judicial review.

It is, therefore, especially interesting to Minnesotans to note that the matter was brought into a state court for the first time in Texas recently, according to the *Journal of the American Medical Association* of October 14, and that the decision of the district court of Travis county upheld the regulation.

Citizenship was required by statute in Texas but the constitutionality of the statute was challenged by a Mexican physician on the ground that the constitution of the United States guarantees the right of an alien to follow any common occupation under the same condition that it imposes on citizens.

The court ruled that the practice of medicine is not a common occupation but a profession impressed in many instances with official and semi-official duties.

Citizenship is required by statute in Arkansas, Delaware, Florida, Georgia, Idaho, Louisiana, Nebraska, New Hampshire, Texas, New Jersey, South Dakota and Wyoming and by regulation of the examining board in Alabama, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Montana, Nevada, North Carolina, Oklahoma, South Carolina, Tennessee, Washington and West Virginia.

First papers are required by law in another group including New York, and by regulation in still another group. Neither citizenship nor first papers are required in Arizona, California, Indiana, Vermont, or the District of Columbia.

## TOLERANCE

(Monthly Editorial Prepared by Medical Advisory Committee)

While attending recent medical meetings in various parts of the State, one was struck immediately by the excellence of the programs, by the unusually friendly attitude of the members one toward another, and by the ability of the men present not only to absorb the commonplace things of medicine but also the fundamentals of intricate practice as outlined to them by the more learned in the particular branch under discussion. This shows reading, study, and thinking far beyond the average.

No longer can the term "old fogy" be used to deride the older man, or "young upstart" be applied to the younger one. They both speak the same language and apply the same thoroughness to medical and surgical problems.

The younger members of the medical profession can well afford to read several chapters from the "book of experience" of the older men, thus gaining quickly that intangible something which only years of contact with the complexities of medical practice can give to them; while the older men may gain much from the younger by absorbing and applying in some measure the enthusiasm which is the grandest possession of youth.

There is one disturbing factor, however, which the Medical Advisory Committee wishes to bring to the attention of the profession. That is the tendency of pre-medical practitioners—internes, fellows, and others closely associated with larger institutions—to asperse the work and ability of men long on the firing line. There seems to be a feeling among these young men that, since the patient has entered their institution, he must immediately be advised that the care he has been given in the past is entirely wrong and, therefore, open to censure and criticism.

Many of them forget that they, too, may some day not be so fortunately situated as to have consultants available at their beck and call; that the x-ray equipment may be miles away when the fracture is to be reduced; that a lonely farm house has been the birthplace of many an obstetrical problem. Valuable experience will be gained, there, under trying conditions, and the old saying, "Whatsoever a man soweth that shall he also reap," will come true for them, too.

It might be well for us all to forget past treatment and attend strictly to the problem at hand when consulted by the patient of another. We should defend the reputation of another as though it were our own.

B. J. B.

## MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

### Julian F. Dubois, M.D., Secretary

### Willmar Physician Sentenced to Term Not to Exceed Four Years for Criminal Abortion

Re: State of Minnesota *vs.* Iver S. Benson

Iver S. Benson, fifty-eight years of age, entered a plea of guilty on September 28, 1939, in the District Court at Willmar, Minnesota, to an information charging him with the crime of abortion and was sentenced by the Honorable G. E. Qvale, Judge of the District Court, to a term of not to exceed four years at hard labor in the State Reformatory at St. Cloud. Dr. Benson was arrested on August 17, 1939, at Willmar, where he maintained his office as a physician and surgeon, on a warrant charging Dr. Benson with manslaughter in the first degree, following the death on August 15, 1939, of a thirty-two year old married woman at Montevideo, Minnesota. At the time of his arrest Dr. Benson admitted that he had performed a criminal abortion upon this woman and that he had received the sum of $25.00 for his services, although he had asked for $50.00. The abortion was done in the office of Dr. Benson at Willmar, on Monday, August 7, 1939. Shortly thereafter the woman became critically ill and a Montevideo physician was called in, who immediately removed her to a hospital. Upon being arraigned in Municipal Court at Willmar, August 18, 1939, Dr. Benson demanded a preliminary hearing which was set for August 24. Bail was fixed in the sum of $7,500.00, which Dr. Benson furnished. On August 24, Dr. Benson waived his preliminary hearing and was held to the District Court.

The investigation also disclosed that another Montevideo woman has been seriously ill since December 14, 1938. This woman stated, in a sworn affidavit, that Dr. Benson had performed a criminal abortion upon her on that date. It has since been necessary to hospitalize this woman on two occasions in order that she might have surgical treatment for the injuries sustained by her at the time of the performance of the criminal abortion. This patient weighed 119 pounds at the time of the abortion and only 74 pounds in July, 1939.

Dr. Benson has been served with a citation requiring him to show cause, on November 3, 1939, before the Minnesota State Board of Medical Examiners, why his license as a physician and surgeon should not be revoked. The records of the Minnesota State Board of Medical Examiners disclose that Dr. Benson was born in 1881, in Jackson, Minnesota, and that he graduated in medicine from the College of Physicians and Surgeons in Chicago, in 1906. He was licensed January 18, 1907, in Minnesota by reciprocity. For the past eight years he has practiced at Willmar and prior to that, for a number of years, he practiced at Montevideo.

The Minnesota State Board of Medical Examiners wishes to acknowledge the prompt and capable handling of this case by Mr. Roy A. Hendrickson, County Attorney of Kandiyohi County, Mr. Clarence A. Rolloff, County Attorney of Chippewa County, and Sheriff Paul E. Anderson of Willmar, Minnesota.

### Otter Tail County Woman Sentenced to Jail Term for Examining Eyes and Selling Glasses

Re: State of Minnesota *vs.* Mary Louise Paulsen

On September 22, 1939, Mary Louise Paulsen, 59 years of age, entered a plea of guilty to an information charging her with the crime of practicing healing without a basic science certificate. Following a statement of the facts in the case to the Court by Mr. Wm. P. Berghuis, County Attorney of Otter Tail County, and Mr. Brist in behalf of the Minnesota State Board of Medical Examiners, the Honorable Anton Thompson, Judge of the District Court, sentenced Mrs. Paulsen to three months at hard labor in the Otter Tail County Jail. Mrs. Paulsen was arrested by Sheriff J. C. Henkes of Otter Tail County, on a warrant charging her with examining eyes and fitting glasses without being properly licensed. When taken before Justice Frank C. Barnes of Fergus Falls, Mrs. Paulsen waived a preliminary hearing and was held to the District Court under $500.00 bond, which she was unable to furnish. She stated that she desired to plead guilty, with the foregoing result.

Upon being questioned by Judge Thompson, Mrs. Paulsen admitted that she had no training in the examination of eyes or the fitting of glasses, except for a period of one week at Chicago, Illinois, where she stated she received some instructions from an optometrist by the name of H. E. Baker. Mrs. Paulsen, at the time of her arrest, was living in a trailer at Leaf Lake about seven miles north of Henning. She would go from farm to farm examining eyes and fitting glasses. When she made a sale she sent the prescription to the Home Service Optical Company at 3737 Fremont St., Chicago, Illinois. Mrs. Paulsen stated that Baker was connected with this company. Mrs. Paulsen received 30 per cent of the selling price of the glasses as her compensation. The glasses sold within a range of $4.00 to $16.00. She stated to the Court that she first came to Minnesota in 1929, on a visit and that she had resided in Otter Tail County for the past two years. She stated that her husband resided at Clear Lake, Iowa. Mrs. Paulsen has a previous conviction, in 1937, in Otter Tail County for petit larceny.

Judge Thompson made it very clear to the defendant that the Court would not tolerate any such unlawful practices and emphasized the necessity of people having specialized training and a proper license if they are going to examine eyes and fit glasses. Mrs. Paulsen seemed quite crestfallen at being sentenced to the County Jail, but the Court advised her that she should have considered that before she proceeded to violate the laws of the State of Minnesota. Judge Thompson told Mrs. Paulsen that after she had served thirty days and had refunded the money to those persons who had not yet received their glasses, and upon assuring the Court that she would absolutely refrain from practicing healing in any manner in the State of Minnesota, the Court would consider an application on her part to suspend the balance of her sentence.

The Minnesota State Board of Medical Examiners wishes to specifically mention the splendid coöperation received from Mr. Berghuis, County Attorney of Otter Tail County, and Sheriff Henkes. Both of them assured the Medical Board that they do not want any unlicensed individuals practicing healing in Otter Tail County and that they will coöperate in every manner in such cases.

### Two Saint Paul Men Plead Guilty to Forging Medical Prescriptions for Alcohol

Re: State of Minnesota vs. Benda
Re: State of Minnesota vs. Foote

Following a joint investigation made by the Liquor Control Commissioner of Minnesota, the Minnesota State Board of Medical Examiners and the Saint Paul Police Department, evidence was procured that

*(Continued on page 801)*

# OF GENERAL INTEREST

Dr. C. L. Eckhardt has announced the opening of an office in Austin, Minnesota. Dr. Eckhardt is a graduate of the University of Minnesota school of medicine, class of 1935, and served his internship at Asbury Hospital, Minneapolis. During the past three years he has been associated with Dr. Arthur F. Bratrud, Minneapolis.

* * *

Dr. Carl E. Johnson of Pine River has received word of his appointment to the Medical Reserve Corps of the United States Army. Dr. Johnson has discontinued his medical practice at Pine River but his family will continue to make their home there.

* * *

Work is under way on a building which, when completed, will house a modern medical clinic in Morris. The clinic will be owned and operated by Doctors L. R. and L. B. Parson of Elbow Lake.

* * *

Dr. J. J. Westra, who for the past two years has been a fellow of the Mayo Clinic at Rochester, has taken over the practice of Dr. C. L. Farabaugh at Owatonna.

Dr. Farabaugh has moved to Minneapolis, where he is associated at the University Hospital in the Department of Ophthalmology.

* * *

Dr. L. E. Koskela, physician and surgeon, opened an office in Sebeka, November 1. Dr. Koskela is a graduate of the University of Minnesota and served his internship at St. Mary's Hospital, Duluth.

* * *

Dr. F. E. Ellison of Monticello is erecting a new office building on Highway 25. The new building will be of Cape Cod design, thoroughly modern, and with landscaped grounds surrounding it.

* * *

Dr. Wayne S. Hagen has opened an office at 2209 Johnson Street N. E., Minneapolis. Dr. Hagen is a graduate of the University of Minnesota, 1934. After spending one year in the Kansas City, Missouri, General Hospital, he was for two years with CCC in Kansas, and spent one year at the Army Hospital, Fort Leavenworth, Kansas. He has been resident physician at Asbury Hospital, Minneapolis, the past year.

* * *

Dr. J. E. Westrup of Maple Lake has moved to Lanesboro, where he will be associated in practice with Dr. F. A. Drake. He is a graduate of the University of Chicago and Marquette University. He served his internship at the Chas. T. Miller Hospital in Saint Paul.

* * *

Dr. R. A. Maves, who has been practicing medicine in Montgomery since last April, has accepted a position with the public health department in Seattle, Washington.

* * *

Dr. E. W. Wahlberg, who has been engaged in the practice of medicine at Morgan, Minnesota, the past two years, has moved to Sleepy Eye, where he has taken over the practice of Dr. James L. Ryan. Dr. Ryan, who has a fellowship in obstetrics and gynecology at the University of Pennsylvania, has moved to Philadelphia.

* * *

Dr. Graham Gable Smith, son of Dr. and Mrs. Vernon D. Smith, of Minneapolis, and Miss Mary Burns, were married in Minneapolis in September. Dr. and Mrs. Smith are now at home in Fulda, Minnesota.

* * *

Dr. Thomas H. Dickson was elected president of the board of directors of the Saint Paul Y.M.C.A., October 13. A member of the board for twenty-five years and treasurer for the past ten years, he headed the membership campaign in 1934. His father, Thomas H. Dickson, Sr., was also at one time president of this organization.

* * *

The following Minnesotans were awarded fellowships in the American College of Surgeons, October 16 at the annual meeting in Philadelphia: Theodore R. Fritsche, New Ulm; Joseph B. Gaida, Saint Cloud; Earl C. Henrikson, Herman; Michael Koller and Louis Robert Koller, Minneapolis; Clarence G. Ochsner, Wabasha; Virgil E. Quanstrom, Brainerd; and John Master Waugh, Rochester.

* * *

## DIRECTORY OF MEDICAL SPECIALISTS

The Advisory Board for Medical Specialties will issue, in December, the first Directory of Medical Specialists listing about 14,000 specialists certified by the twelve American Boards and the two affiliate Boards in the Specialties. The volume will present information about the Advisory Board, detailed biographical listing of the Diplomates, and will give full information regarding admission.

It is expected the Directory will be published every two years. It should prove valuable to physicians in referring patients.

The subscription price is $3.50 and the volume may be ordered directly from the Columbia University Press, 2960 Broadway, New York, N. Y., or through the office of the Directing Editor, Dr. Paul Titus, 1015 Highland Building, Pittsburgh, Pa.

# In Memoriam

## Guy R. Caley
### 1874-1939

DR. GUY R. CALEY, Princeton, Minnesota, died September 26, 1939, following several years of disability from a heart ailment.

Dr. Caley was born at Princeton, January 9, 1874, the son of Dr. David A. Caley. Following the death of his father in 1887, the family moved to Faribault, where Dr. Caley attended Shattuck. After graduating from Shattuck he entered the University of Minnesota medical school, where he received his medical degree in 1900.

After a year's internship at Saint Joseph's Hospital, Saint Paul, he began practice at Princeton.

In 1902 Dr. Caley married Mary Strum of Chippewa Falls, Wisconsin. Mrs. Caley died a year later. For several years thereafter Dr. Caley lived with his cousin, Clair Caley, in Princeton.

In 1918 Dr. Caley married Edna Hayes of Saint Paul. Mrs. Caley passed away March 23 of this year.

Dr. Caley's favorite hobby was gardening. He loved flowers and for years had one of the finest gardens in the village. He was an authority on the growing of many varieties of flowers.

Dr. Caley was a kindly man, and, like his father was too generous for his financial welfare. His memory will long be cherished by scores of warm friends in his community.

Dr. Caley is survived by two brothers, Earl Daniel and Louis Collins, both of Seattle, and a daughter, Mary Ann. Dr. Caley's two sisters, Martha and Catherine, preceded him in death. Catherine was formerly head mistress at Saint Mary's Academy at Faribault.

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## Charles T. Granger
### 1870-1939

Dr. Charles T. Granger of Rochester, Minnesota, was born in Olmsted County, Minnesota, July 30, 1870. He practiced in Rochester from 1892 until his death, October 4, 1939, with the exception of two years at McGregor, Minnesota, from 1928 to 1930.

Dr. Granger graduated from Hahnemann College, Chicago, in 1892, and later studied at Johns Hopkins.

In 1935 Dr. Granger published a series of articles entitled "The Saga of a Country Doctor" which attracted widespread attention.

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## Martha B. Moorhead
### 1865-1939

Dr. Martha B. Moorhead of Minneapolis, was born in 1865 and died October 14, 1939.

She attended Wellesley College and received her medical degree from the Woman's Medical College in Philadelphia in 1892. Her internship was served in the New England Hospital for Women and Children in Boston.

In 1894 Dr. Moorhead became superintendent of Northwestern Hospital, Minneapolis, but after two years entered private practice. A year was spent in postgraduate work in Vienna, after which she specialized in gynecology.

At one time Dr. Moorhead taught courses for nonmedical students at the University of Minnesota in public health and nursing care. She was an affiliate member of the Hennepin County Medical Society and the Minnesota State and American Medical Associations.

Dr. Moorhead is survived by a sister, Mrs. H. B. Nesbit, of Washington, D. C., and a brother, W. Paul Moorhead, of Minneapolis.

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## Edward L. Paulsen
### 1883-1939

Dr. Edward L. Paulsen, who lived at 121 W. Elmwood Place, Saint Paul, but practiced in Minneapolis, where he was a member of the Hennepin County Medical Society, died October 7, 1939, at the age of fifty-seven.

Dr. Paulsen was born in 1883. He graduated from the University of Minnesota Medical School in 1909. He was a member of the College of Surgeons and a members of the Masonic Order. For a number of years he was a member of the Board of Deacons of Calvary Baptist Church, Minneapolis.

Dr. Paulsen is survived by his widow and a son, John E. Paulsen.

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## J. C. Rothenberg
### 1860-1939

Dr. J. C. Rothenberg of Springfield, Minnesota, died October 15, 1939, at the age of seventy-nine.

Born April 5, 1860, at Amhurst, New York, Dr. Rothenberg graduated from the University of Michigan in 1885. He took postgraduate work in New York City in 1896 and again in 1916.

On December 15, 1936, a banquet was tendered in his honor in commemoration of the completion of fifty years of practice. Dr. Rothenberg was an affiliate member of the Redwood-Brown County Society, the Minnesota State and American Medical Associations.

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## Thordur Thordarson
### 1865-1939

DR. THORDUR THORDARSON of Minneota, Minnesota, died August 2, 1939, at the age of seventy-four.

Thordur Thordarson was born at Stao i Hrut a fordi, Hunavatrissysla, Iceland, January 3, 1865. When he was eight years old his family came to this county and located in Shawano County, Wisconsin, where the doctor's father died the following year.

Among the doctor's fondest recollections of Iceland

were those of his schoolmates in Reykjavik. He had been a leader among them, and the young men who stayed on in the homeland after he left for the new world included several destined to become distinguished leaders of their nation.

The interchange of letters, and occasional greetings sent from anniversary reunions in later years, kept Dr. Thordarson in touch with such distinguished classmates as Dr. Gudmundur Hannesson, teacher in Iceland's school of medicine; Dr. Gudmundur Björnsson, for years a parliamentary leader and the nation's chief health officer; Eggert Briem, member of Iceland's supreme court, and several other similarly situated leaders.

Remaining for a time at the farm home which members of his family had established near Gardar, Dr. Thordarson began a brief career in electrical engineering by enrolling in that course at Cornell University, at Ithaca, N. Y. He aided his younger brother, C. Hjörtur, when the latter was laying the foundation for the inventive and engineering career which brought world renown in his field as head of the Thordarson Electric Company in Chicago.

Before entering upon his medical course, Dr. Thordarson did electrical work for some time, working while electrical street car systems were first being installed in such metropolitan centers as the Twin Cities, St. Louis and San Francisco. Returning to Chicago, he took the medical course at the University of Illinois, receiving his M.D. degree there in 1896 and his license to practice in 1897. In the latter year he came to Minneota, took up the practice of medicine, and continued it as long as his health permitted, continuing to make Minneota his home until his death.

Dr. Thordarson, with the late Rev. B. B. Jónsson, was one of the founding editors of "Vínland," Icelandic monthly published in *The Mascot* plant from 1902 to 1908. The periodical was the only Icelandic newspaper published in the United States, and it held an enviable reputation among Icelanders in the home country as well as in Canada and the United States. In the literary criticisms and editorial features he contributed to that periodical, Dr. Thordarson showed genuine writing ability and the same remarkable versatility of intellect as characterized his other performances.

Dr. Thordarson was married on February 6, 1901, to Sigurbjörg, daughter of Mr. and Mrs. Sigurbjörn Asbjörnson of Selkirk, Manitoba. They made their home in Minnesota, and to them three children were born: Wilhjalmur, who died January 8, 1937; Maria Adalbjorg of Gary, Indiana, and Sigurbjörg, who died August 12, 1905. Mrs. Thordarson passed away July 10, 1905.

During the World War, Dr. Thordarson enlisted in the United States Army and served as medical officer at Camp Funston. He was a member of the Lyon County Medical Association, the Minnesota State Medical Association, and the American Medical Association.

The only surviving member of the Thordarson family now is the doctor's brother, C. H. Thordarson of Chicago, Illinois.

## MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

*(Continued from page 798)*

resulted in the prosecution of Frank Benda, thirty-five years of age and Walter Foote, twenty-three years of age, for forging and presenting fictitious medical prescriptions for alcohol to registered pharmacists. Due to the fact that the evidence indicated that the alcohol was used for their own consumption and not for resale, they were permitted to plead guilty to a misdemeanor and were each fined $50.00 or thirty days in the Saint Paul Workhouse; each paid the fine. They were admonished by Judge Finehout that a repetition of this offense would bring a much more severe sentence. Benda and Foote have been employed for some time as meat cutters for the National Tea Company, Benda living at 391 Selby Ave., Saint Paul, and Foote at 1265 Dayton Ave., Saint Paul. Up until the spring of 1939, they had been obtaining their alcohol at the Sundry Drug Store at Rice and Summit Ave., in Saint Paul, but their source of supply was shut off when Sundry was sentenced to thirty days in the Saint Paul Workhouse for a violation of the State Liquor Control Act in connection with the filling of fictitious medical prescriptions for alcohol. Shortly thereafter it was discovered that similar prescriptions were being filled at the River Road Pharmacy at 14-27th Ave., Minneapolis, operated by one Harold Smetana. Practically all of the prescriptions bore Saint Paul addresses and had been forged by Benda and Foote, both of whom admitted that they obtained the prescriptions from Smetana, and this was also admitted by Smetana. Some of the physicians' names that were forged to these prescriptions are as follows: Drs. A. A. McDonald, C. Godwin, B. T. Thompson, B. C. Thomson, B. C. Clark, F. C. Clark, George G. Clark, W. W. Johnson, A. C. Caldwell, Gordon Weed and M. G. Goldbend.

The Minnesota State Board of Medical Examiners adopted the policy, several years ago, of coöperating with the State Liquor Control Commissioner in enforcing the law with respect to medical prescriptions for alcoholic liquors. Due to the fairness of the legislature of Minnesota, and other public officials, the medical profession enjoys the privilege of writing bona fide medical prescriptions for alcoholic liquors without any requirement of a special license fee or governmental order book, or any other red tape, and a registered pharmacist is permitted to fill these prescriptions upon the payment of a $5.00 annual license fee. Obviously, unless this law is respected by the medical profession and the pharmacists, other steps will undoubtedly be taken by the legislature to correct this evil. It is very apparent that the large majority of the medical profession and the registered pharmacists, comply with the law, but there is still a small number of physicians, pharmacists and others, who continue to violate this law. The Medical Board has attempted to give suitable publicity to the position taken by the Board, and to the fact that medical men will be prosecuted in the Courts for a violation of this law, and in addition, they subject themselves to a suspension or revocation of their license as physicians, one physician already having had his license suspended for a period of three months.

Benda was arrested on October 5, and entered a plea of guilty on October 7, 1939. Foote was arrested on October 11, and entered a plea of guilty on October 12, 1939.

## MINNESOTA PUBLIC HEALTH ASSOCIATION

Friday, November 3, is the date of the 33rd annual meeting of the Minnesota Public Health Association, with daytime sessions in Saint Paul and the dinner meeting in Minneapolis.

"War and Tuberculosis" will be the subject of an address to be given by Dr. J. A. Adamson of Winnipeg, Canada, professor of medicine, Manitoba University, and medical director, St. Boniface Sanatorium, St. Vital, Manitoba, at the Christmas Seal dinner to be held at the Hotel Nicollet at 6:30 p. m. At this same session Governor Stassen will tell of Minnesota's peace-time program against tuberculosis. Dr. S. A. Slater, president of the Minnesota Public Health Association, will give a memorial address on Dr. Charles H. Mayo, who was honorary life president of the Association. Dr. F. J. Hirschboeck will be toastmaster. Greetings from the Hennepin County Tuberculosis Association will be extended by its president, Dr. Stephen H. Baxter, and from the National Tuberculosis Association by Dr. J. A. Myers, former president of the National Association.

At the noonday session in Saint Paul, Dr. H. E. Hilleboe will speak on "Observations on My Trip to Europe."

Dr. E. A. Meyerding, executive secretary of the Minnesota Public Health Association, is in charge of arrangements.

## SCOTT-CARVER SOCIETY

The Scott-Carver Medical Society held its first fall meeting October 10, at Mudcura Sanitarium, Shakopee.

Dr. Arthur Kerkhof, of Minneapolis, addressed the members on "New Aspects of Endoscopy." Dr. Norman Nelson, also of Minneapolis, spoke on "Problems of Pernicious Anemia."

## WEST CENTRAL SOCIETY

The thirty-seventh annual meeting of the West Central Medical Society was held in Morris, Minnesota, October 11, 1939. After dinner at the Merchants Hotel the guest speaker of the evening was Dr. Macnider Wetherby of Minneapolis. He talked on different treatments of arthritis.

Superintendent Ray Amberg of the University Hospital explained the relationship between the University Hospital and the different welfare boards throughout the state. He stated the function of the University Hospital was more to obtain teaching material for the medical school than to take care of relief patients.

Mrs. Virginia Liebeler gave a review on hospital insurance and how it worked out in the large hospitals in the cities. She explained her talk with charts and graphs.

Election of officers for the coming year resulted as follows: President, Dr. E. M. Elsey, Glenwood; Vice President, F. W. Behmler, Morris; Secretary-Treasurer, Dr. H. Linde, Cyrus; Censor for three years, Dr. A. F. Giesen, Starbuck. Dr. C. I. Oliver, Graceville, was elected delegate to the state convention, with Dr. Chas. Bolsta, Ortonville, as Alternate. Drs. Robert Merrill, Morris, John A. Magnuson, Graceville, and C. R. Christenson, Starbuck, were accepted as members of the society.

## SOUTHERN MINNESOTA MEDICAL ASSOCIATION

The meeting of the Southern Minnesota Medical Association held September 18, 1939, at New Ulm, was well attended, 129 physicians having registered. An attendance of 137 physicians and their wives was reported at the banquet.

Officers elected for the ensuing year are: Dr. James Morrow, Austin, president; Dr. Charles Koenigsberger, Mankato, first vice president; Dr. E. A. Kilbride, Worthington, second vice president; Dr. N. W. Barker, Rochester, secretary-treasurer.

## MEDICAL SERVICE FOR CIVILIAN CONSERVATION CORPS

Medical service for the Civilian Conservation Corps has, in the past, been furnished by the medical section of the Officers' Reserve Corps with the exception of a few doctors who were employed on a contract basis. A recent decision of the Director of the CCC and the War Department permits the employment of doctors who are not Medical Reserve officers in this service.

Doctors needed for this service may be now employed under the rating of civilian employees. Under date of October 10, 1939, the initial salary was changed from $2,600 per annum to $3,200 per annum. No quarters for families are provided, and the doctor will be required to pay for his food at camps. Temporary quarters for the doctor will be provided at the camps for a nominal fee. Doctors selected for this service will be required to pay their own travel expenses to the nearest district headquarters, where they will be put on temporary duty for instructional purposes before being sent to camps. Travel expenses incurred in the transfer of doctors from the district headquarters to camps or in the transfer from one camp to another will be paid by the Government. If the services rendered are satisfactory, the employment is more or less permanent.

The principal duties at camps consist of the medical care of the enrollees and the practice of preventive medicine. To be eligible for this servce, the doctor must be legally qualified to practice medicine and physically able to perform the duties involved.

All doctors interested in this type of service are requested to submit their applications to the office of the Surgeon, Headquarters Seventh Corps Area, Federal Building, Omaha, Nebraska, giving date when available and preference of assignment in the following states: Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Missouri, Kansas, and Arkansas.

# WOMEN'S AUXILIARY

MRS. A. C. BAKER, Fergus Falls, *President*
MRS. E. V. GOLTZ, 2259 Summit Avenue,
Saint Paul, *Publicity Chairman*

Mrs. A. C. Baker, president of the State Auxiliary, attended the Northern Minnesota Medical Association's annual meeting at Detroit Lakes, Minnesota, September 8 and 9. Mrs. Wm. B. Roberts of Minneapolis, past president of the Auxiliary, also attended the meetings with Dr. Roberts and they were the house guests for the week end of Dr. and Mrs. J. F. Norman of Crookston, Minnesota.

### Clay-Becker County

The Women's Auxiliary to the Clay-Becker Medical Society entertained the wives of the visiting doctors, attending the Northern Minnesota Medical Association meeting held September 8 and 9 at Detroit Lakes, Minnesota. The wives were guests of the Clay-Becker Auxiliary at a luncheon and bridge given at the Park Hotel on September 8. Prizes were won by Mrs. Brown of Crookston, Mrs. Simison of Barnesville, Mrs. Hans Johnson of Kirkhoven and Mrs. Ederer of Mahnomen. Members from other Auxiliaries throughout Northern Minnesota as well as the local Auxiliary enjoyed the talk given during the afternoon by the state president, Mrs. A. C. Baker, of Fergus Falls. Following the afternoon party, the women met with their husbands at the annual banquet. While the business meeting for the doctors was held in the morning of September 9, members of the Clay-Becker Auxiliary took the wives for a drive about the lakes. The doctors and their wives joined in a golf tournament in the afternoon at the Detroit Lakes Country Club, closing the annual session.

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Members of the Clay-Becker Auxiliary are sponsoring a sale of articles made by the patients of the Sand Beach Sanatorium, which will be held during December. Sales will be held at Moorhead, Minn., and at Detroit Lakes.

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Mrs. J. J. Ryan of Saint Paul, third vice president of the State Auxiliary has returned from San Francisco, California, where she attended the National Council of Catholic Women as a delegate from the Guild of Catholic Women of Saint Paul. She visited also in Los Angeles and El Paso, Texas, where she visited the Carlsbad Caverns, and with relatives in New Orleans and Oconomowoc, Wisconsin. In Chicago she conferred with members of the National Board of the Woman's Auxiliary relative to her work as National Historian.

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### Stearns-Benton Auxiliary

The Stearns-Benton Medical Auxiliary have made plans for a very interesting and worthwhile year. The first meeting of the season was held Thursday, September 21, at the Mohr hostess house at 6:30 p. m., with the state president, Mrs. A. C. Baker of Fergus Falls, as guest of honor. The business meeting was presided over by the president, Mrs. T. N. Fleming, with reports on *Hygiea* given by Mrs. J. C. Buscher and a report on layettes given by Mrs. M. J. Kern. A budget committee was appointed with Mrs. T. W. Hovorka as chairman and Mrs. William Friesleben and Mrs. M. J. Kern, members. The Auxiliary has decided to sponsor the tuberculosis contest again this year and they have made tentative plans for a rummage sale. Mrs. T. N. Fleming and Mrs. J. B. Gaida gave reports on the state convention which was held in May in Minneapolis. Mrs. A. C. Baker was the guest speaker and brought before the group an outline of the work as proposed by the State Auxiliary for the coming year, stressing organization and membership. She also stated that a statewide program of legislation would be manifest during the coming year because of the crisis through which the medical profession is passing at present. A delightful musical program was given by members of the Technical school. Additional guests for the evening included Mrs. S. J. Raetz of Watkins and Miss Mary Baker, daughter of Mrs. A. C. Baker of Fergus Falls.

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### Washington County Auxiliary

On June 13, Mrs. F. G. Landeen was hostess to the Washington County Medical Auxiliary at her home, 724 Martha St., Stillwater. Ten members were present. The regular meeting preceded the annual reports. Officers elected for the coming year included: President, Mrs. E. Sydney Boleyn; vice president, Mrs. F. M. McCarten; secretary-treasurer, Mrs. Ray Johnson. The first meeting of the new year was held in October.

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## MEDICAL BROADCAST FOR NOVEMBER

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:00 o'clock every Saturday morning over Station WCCO, Minneapolis (810 kilocycles or 370.2 meters) and Station WLB, University of Minnesota (760 kilocycles or 395 meters).

*Speaker:* William A' O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota. The program for the month will be as follows:

November 4—Tuberculosis
November 11—Pneumonia
November 18—Common Cold
November 25—Nutrition and the Teeth

# BOOK REVIEWS

**Books listed here become the property of the Ramsey, Hennepin and St. Louis County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.**

THE HEALTH INSURANCE DOCTOR. His Rôle in Great Britain, Denmark and France. Barbara N. Armstrong. 264 pages. Price, $3.00, cloth. Princeton, N. J.: Princeton University Press, 1939.

AN INTRODUCTION TO MEDICAL MYCOLOGY. George M. Lewis, M.D., Member American Dermatological Association, Inc., Fellow American College of Physicians, American Medical Association, New York Academy of Medicine, etc.; and Mary E. Hopper, M.S., Assistant in Mycology, Skin and Cancer Unit, New York Post-Graduate Medical School and Hospital, Columbia University. 315 pages. Illus. Price, $5.50, cloth. Chicago: Year Book Publishers, 1939.

A TOPOGRAPHIC ATLAS FOR X-RAY THERAPY. Ira I. Kaplan, B.S., M.D., Director Radiation Therapy Department, Bellevue Hospital, Director Division of Cancer Department of Hospitals, City of New York, Clinical Professor of Surgery, New York University Medical College, et cetera; and Sidney Rubenfeld, B.S., M.D., Associate Visiting Radiation Therapist, Bellevue Hospital, Instructor in Surgery, New York University Medical College, et cetera. Illus. Price, $4.00, cloth. Chicago: Year Book Publishers, Inc., 1939.

PRIMER OF ALLERGY. Warren T. Vaughan, M.D., Richmond, Va. 140 pages. Illus. Price, $1.50, cloth. St. Louis: C. V. Mosby Co., 1939.

SKETCHES IN PSYCHOSOMATIC MEDICINE. Smith Ely Jelliffe, M.D., Consulting Neurologist to Manhattan State and Kings Park Hospitals, New York. 155 pages. Price, $3.00, stiff board cover. New York: Nervous and Mental Disease Publishing Co., 1939.

TEXTBOOK OF NERVOUS DISEASES. From the Fifth German Edition. Robert Bing, Professor of Neurology, University of Basel, Switzerland. Translated and enlarged by Webb Haymaker, Assistant Clinical Professor of Neurology and Lecturer in Neuro-Anatomy, University of California. 838 pages. Illus. Price, $10.00, cloth. St. Louis: C. V. Mosby Co., 1939.

PSYCHOBIOLOGY AND PSYCHIATRY. Wendell Muncie, M.D., Associate Professor of Psychiatry, Johns Hopkins University, Assistant Psychiatrist Henry Phipps Psychiatric Clinic, Johns Hopkins Hospital. Foreword by Adolf Meyer, M.D., LL.D., Sc.D., Professor of Psychiatry and Director of the Department of Psychiatry, Johns Hopkins University. 739 pages. Illus. Price, $8.00, cloth. St. Louis: C. V. Mosby Co., 1939.

SYNOPSIS OF PEDIATRICS. Third Edition. John Zahorsky, A.B., M.D., F.A.C.P. Professor of Pediatrics and Director of Department of Pediatrics, St. Louis University School of Medicine, and Pediatrician-in-Chief St. Mary's Group of Hospitals, etc.; assisted by T. S. Zahorsky, B.S., M.D., Instructor in Pediatrics, St. Louis University School of Medicine and Assistant Pediatrician to St. Mary's Group of Hospitals. 430 pages. Illus. Price, $4.00, flexible binding. St. Louis: C. V. Mosby Co., 1939.

MICROBIOLOGY AND PATHOLOGY. Charles F. Carter, B.S., M.D., Director of Carter's Clinical Laboratory, Dallas, Texas, and consulting pathologist for several hospitals. Second edition. St. Louis: C. V. Mosby Company.

This book is an outgrowth of Bacteriology for Nurses by the same author. A second part dealing with the principals of pathology has been added and the original work on bacteriology has been considerably revised. The two parts of the book are organized along the widely used outlines for text books on bacteriology and pathology. The author has constantly kept the educational status of his student in mind. The ground is logically and thoroughly covered in both basic sciences. The book can be recommended as a text for the student nurse.

ARTHUR H. WELLS.

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THE ART OF ANÆSTHESIA. By Paluel J. Flagg, M.D. 6th edition, revised. 491 pages, Illus. Philadelphia: J. B. Lippincott Co., 1939.

In this, the sixth edition of his well-known work, Dr. Flagg has the active experience of a quarter of a century since the first edition was published to guide him in stressing the things of real importance in the field of Pneumatology. The book is technical, of course. Everything is condensed and tabulated. Nevertheless, it is still interesting and readable. The author injects just enough of his vigorous personality to give it a humanistic flavor. Nowhere is this better illustrated than in the fine chapter on "The Point of View of the Patient." Speaking of the poor in the great hospitals and dispensaries: "If we would be compensated we must see an image of the Almighty in their presence. We must feel the unspoken thanks which illiteracy cannot utter."

From a technical standpoint the discussion and illustration of the newer methods of intratracheal anesthesia might be singled out for special commendation but it would seem to me that the entire field is exhaustively examined and clearly presented.

C. H. SCHROEDER, M.D.

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DISEASES OF THE SKIN. By Richard L. Sutton, M.D., Sc.D., L.L.D., F.R.S. (Edin.), Professor of Dermatology, Univ. of Kansas, School of Medicine and Richard L. Sutton, Jr., A.M., M.D., L.R.C.P. (Edin.), Associate in Dermatology, Univ. of Kansas, School of Medicine. 1,549 pages. Illus., $15.00. St. Louis: C. V. Mosby Co., 1939.

The tenth edition of Suttons' dermatological work has just arrived and a careful review of its presentations reveals a very worthwhile work. The text is forward, plain, explicit, ample and appropriate. The illustrations are remarkable. The photography is something to be highly comended, showing in detail as much as it is possible to show skin lesions and all are faithful representations of the pathology reviewed. The authors went far and wide to get photographs of each individual entity and have succeeded far beyond anything in print so far as we know. The descriptions covering these illustrations are very graphic, clear and to the point.

The authors follow the usual plan of discussing each condition; first, etiology, then the pathology, symptomatology and treatment, and it is so written that not only is it a very reliable reference for the men doing special work in dermatology, but it makes an excellent guide for the general practitioner, and it is not too much to say that the average man should be able to recognize sixty per cent of the dermatology which he sees in his practice with the aid of a work such as this.

Especially to be commended is the treatment wherein all useful remedies are carefully listed and appropriately stressed. The book also discusses the more scientific developments covered by recent research, and attached to each chapter is an excellent bibliography of the work covered in these particular chapters.

All in all, the two Suttons, father and son, have done a noble service to the medical profession in presenting it with such a scientific and skillful textbook.

E. Z. SHAPIRO, M.D.

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THE ROCKEFELLER FOUNDATION—Annual Report for 1938, 49 West 49th Street, New York City, N. Y. 515 pages. Illus.

This volume, 1¼ inches thick, abounds in reports of all the services which are world-wide in extent. In the Treasurer's report a total of $157,339,992.30 was devoted to the vast uplift enterprises of this remarkable institution. The Foundation's largest commitment during 1938 in the field of Natural Sciences was a conditional appropriation of one and a half-million dollars to the University of Chicago toward the establishment of a $2,000,000.00 endowment fund for research in the biological sciences. Harvard received $100,000.00 toward research in Physical Chemistry in its Medical School. In the Far East, principally in China, the Foundation to date of its report has appropriated about $49,000,000.00; the greater part in connection with the Peiping Union Medical College. Many applications to the Foundation for aid (two thousand or more) were declined, a large proportion being not within the scope of Foundation policy.

In the International Health Division, under the direction of Dr. Wilbur A. Sawyer, the program is broad, the primary activities being: (1) a search for new knowledge directly applicable to disease prevention; (2) coöperation in investigations of diseases of importance to public health; and (3) demonstrations of the applications of new knowledge. $2,200,000.00 was devoted to this program. Virus diseases received a large share of attention, the ultimate goal being prevention. Yellow fever vaccintaion is one of the agencies in process.

In the department of the Medical Sciences, psychiatry has received considerable financial encouragement through certain researches within such medical schools as the University of Chicago, Columbia University, Washington University, Cornell, Mandsley Hospital of London, the Neurological Center of Brussels and many others.


**SILVER PICRATE** *Wyeth's*

***has shown a***

**CONVINCING RECORD OF EFFECTIVENESS *in* ACUTE ANTERIOR URETHRITIS**

***due to Neisseria gonorrheae***

**The record is based on rigid clinical and laboratory signs before and after treatment.***

**1. Fresh smear**
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**Silver Picrate is a crystalline compound of silver in definite chemical combination with picric acid. Dosage form for use in Anterior Urethritis: Wyeth's Silver Picrate Crystals used in an aqueous solution of 0.5 percent.**

***Supplied at all pharmacies in vials of 2 grams***

**Complete literature on Silver Picrate as used in genito-urinary and gynecological practice will be mailed on request.**

*"Treatment of Acute Anterior Urethritis with Silver Picrate," Knight and Shelanski, AMERICAN JOURNAL OF SYPHILIS, GONORRHEA AND VENEREAL DISEASES, Vol. 23, No. 2, pages 201-206, March, 1939.

**JOHN WYETH AND BROTHER, INC. • PHILADELPHIA, PA.**

Public Health teaching and research in maternal health and other educational projects participate in liberal material support. Sixty-eight fellowships in the medical sciences were granted in 1938 to individuals in Belgium, China, Hungary, Iceland, Italy, Java, Lithuania, Peru, Poland, Switzerland and many other countries.

The extensive and far-reaching progressive program in the Natural Sciences, the Social Sciences and the Humanities and the activities of its Research Aid Fund for Deposed Scholars reveal the broad scope of The Rockefeller Foundation. A perusal of its annual report is recommended.

ARTHUR N. COLLINS, M.D.

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TEXTBOOK OF HEALTHFUL LIVING. Revised Edition. By Harold S. Diehl, M.A., M.D., Sc.D. Cloth. Price $2.50. 634 pages. New York: McGraw-Hill Book Company, Inc., 1939.

Doctor Diehl's book, "Healthful Living," was published first in 1935. This book was written for the general reader, but was used as a textbook in many colleges. The revised edition, which is now off the press, is designed as a college text for hygiene courses. The book has been considerably lengthened, the order of subject matter development changed, and new chapters added on "Modern Parenthood," "Community Health," and "Organized Health Work." A well-selected bibliography is included with each chapter. A valuable addition in the appendix is the "Report on Communicable Disease Control of the Committee on Research and Standards of the A.P.H.A."

The practitioner will be struck by the fact that this book seems to anticipate very well the questions people ask on various health subjects. The style is interesting and the book layout is refreshing rather than fatiguing. The discussion of such topics as exercise, stimulants, sex life, mental hygiene, is almost unique in being conservative, free of dogmatism and crusading, in presenting a sound, "pro and con" viewpoint, and withal leaving a wholesome impression. Likewise commendable is the fact there is no great detailing of such topics as vitamins and endocrines beyond practical needs, for in these fields knowledge is so fluid and intricate that details cannot well be maintained in mind by the lay person, even if once learned. The book discusses effectively the need of selecting and using a family physician and of maintaining high medical standards. The reviewer believes this to be the best available book for its purpose.

C. J. P.

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TREATMENT IN GENERAL PRACTICE. By various British authors. With a preface by Reginald Fitz, M.D., F.A.C.P., 2 vol., 680 pages. Illus. Price $7.50. Boston: Little, Brown and Company, 1939.

This book, first published in England in 1936, is a collection of specially written articles which appeared in the *British Medical Journal*. They were written by various well known clinical teachers. The first volume deals with acute infectious and cardiovascular diseases; the second with more chronic conditions such as those affecting the nervous system, rheumatism, metabolic diseases, kidney diseases and disorders of the blood forming organs. In addition, the treatment of such symptoms as melena, dyspepsia, constipation are discussed.

The text is very readable and each subject is dealt with briefly but thoroughly. The directions given are simple and clear. A moderate number of prescriptions are included. The drugs recommended, however, all bear their British trade names and manufacturers' names, which for the most part will be unfamiliar to the American reader. Therapeutic measures which add much to the comfort of the patient sick at home are abundantly described. Little or no mention is made of the use of sulfanilamide or sulfapyridine. This is probably due to the fact that the articles were written prior to 1936 when these drugs were relatively unknown.

The reader of these volumes will gain much knowledge of British methods of treatment and will find much of practical value which does not appear in American texts of similar nature.

W. D. COVENTRY, M.D.

# CORRESPONDENCE

**Biography of Dr. Harvey Cushing**

Mrs. Cushing has requested me to prepare a biography of her husband and I should be most grateful to anyone who wishes to make letters, anecdotes or other memorabilia available.

Copies of all letters, no matter how brief, are desired, and if dates are omitted it is hoped that, when possible, these may be supplied (*e. g.*, from the postmark). If original letters or other documents are submitted, they will be copied and returned promptly.

A new Medical Library building is being erected at the Yale University School of Medicine to receive Dr. Cushing's library and collections, including his letters, diaries and manuscripts. Any of his friends who wish, now or later, to present correspondence, photographs or other memorabilia for permanent preservation among the Cushing papers will receive the appreciative thanks of the University.

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